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June 4, 2013

Mr. Scott Martin, Remedial Project Manager
United States Environmental Protection Agency - Region 4
Atlanta Federal Center
61 Forsyth Street
Atlanta, Georgia 30303

Subject: **2012 ANNUAL GROUNDWATER MONITORING AND INSPECTION REPORT**
HERCULES 009 LANDFILL
BRUNSWICK, GLYNN COUNTY, GEORGIA
EPA IDENTIFICATION No. GAD980556906
ANTEA GROUP PROJECT NO. WBS23413L1

Dear Mr. Martin:

On behalf of Hercules Incorporated, Antea USA, Inc. (Antea™Group) is pleased to present the following *2012 Annual Groundwater Monitoring and Inspection Report* for the Hercules 009 Landfill in Brunswick, Georgia. The attached document discusses the operations, maintenance, and monitoring requirements set forth in the Hercules 009 Landfill Record of Decision (March 25, 1993). If you have any questions, please contact Tim Hassett 302-995-3456 or me at (704) 543-3910.

Sincerely,

Gary C. Ribblett
Senior Project Manager
Antea Group

cc: Mr. Tim Hassett – Hercules Incorporated, Wilmington, DE
E. Williams – GA EPD, Atlanta, GA
D. S. Parshley – Glynn County Environmental Coalition, Brunswick, GA

2012 Annual Groundwater Monitoring and Inspection Report

Hercules 009 Landfill
Brunswick, Glynn County, Georgia
EPA Identification No. GAD980556906

Antea Group

Prepared for:
Hercules Incorporated
Ashland Hercules Research Center
500 Hercules Road
Wilmington, Delaware 19808

Prepared by:
Antea USA, Inc.
8008 Corporate Center Drive, Suite 100
Charlotte, North Carolina 28226

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Brunswick, Glynn County, Georgia
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1.0 INTRODUCTION

On behalf of Hercules Incorporated (Hercules), Antea USA, Inc. (Antea™Group) is pleased to present this report summarizing the groundwater sampling activities and site inspection conducted at the Hercules 009 Landfill (the site) located along Highway 25 in Brunswick, Glynn County, Georgia (**Figure 1**).

This report presents the findings of the annual sampling event, conducted on May 17 through 18, 2012 that satisfies the operations, maintenance, and monitoring requirements for the 009 Landfill Record of Decision (ROD), which set forth annual site-wide monitoring and inspection activities. The ROD requires annual groundwater quality monitoring for consecutive periods of five years. The United States Environmental Protection Agency (EPA) is authorized to consider revisions to the monitoring program at the conclusion of each five year period so long as the monitoring program remains appropriate to conditions at the site and continues to verify the long-term performance of the remedy.

In March 2009, the EPA approved a reduction in the number of monitoring wells sampled as a part of the annual monitoring program. The following report presents a summary of the 2012 field activities and procedures, the laboratory analytical results, and our conclusions and recommendations based on the data collected.

2.0 ACTIVITIES PERFORMED DURING THIS PERIOD

The following tasks were completed on May 17 through 18, 2012:

- Depth-to-groundwater was measured in monitoring wells N-1, N-2, N-3, N-5, N-6SR, N-6DR, N-7, N-8, N-9S, N-9D, N-10, N-12, N-13, N-14S, N-14D, N-15S, and N-15D;
- Groundwater samples were collected from monitoring wells N-5, N-6DR, N-7, N-10, N-12, N-15S, and N-15D; and,
- Inspection documentation of the condition of the 009 Landfill cover.

3.0 BACKGROUND

The site is located in the eastern portion of Glynn County, Georgia approximately two miles south of Interstate 95 and ½-mile north of the City of Brunswick. A site location map is included as **Figure 1**. The site is located within a 16.5-acre parcel of land bordered by Georgia State Highway 25 (Spur 25) to the west, an automobile dealership (Nalley Automotive) to the north, a juvenile slash pine forest to the east, a residential area, church, school, and strip shopping center to the south and southeast. A shopping mall, bank, and restaurant built in 1985 are located approximately 1,000 feet to the north of the site. The site is fully enclosed by a fence and has four entrances with locked gates.

The 009 Landfill occupies seven acres at the northern end of the site. This portion of the site was used by the State of Georgia as a soil borrow pit during the construction of Spur 25 prior to its use as a landfill by Hercules. Six landfill cells measuring approximately 100 to 200 feet north to south and 400 feet long west to east were constructed to receive wastewater sludge generated from the production of toxaphene at the Hercules Brunswick facility. Toxaphene sludge was disposed at the site until 1980 under a permit issued to Hercules in 1975 by the Georgia Environmental Protection Division (GA EPD). Stump dirt, empty toxaphene product drums, toxaphene-affected glassware, rubble, trash and construction debris from the Hercules Brunswick facility were also disposed of in the 009 Landfill.

In 1980, results of routine sampling conducted by GA EPD indicated the presence of toxaphene in the drainage ditch adjacent to the site. Disposal activities at the site were terminated and the 009 Landfill was closed in accordance with a GA EPD-approved closure plan. In 1984, the site was placed on the National Priorities List (NPL), and in 1988, Hercules entered into an Administrative Order on Consent (AOC) with the EPA to conduct a remedial investigation (RI) of the site.

Beginning in 1988 and continuing through 1999, the site was the subject of numerous site investigations, field treatability studies, and remediation activities. Cement stabilization and solidification of the 009 Landfill was completed in February of 1999. Ongoing remedial activities now include only annual groundwater monitoring and maintenance of the 009 Landfill cover.

In 2005, Nalley Automotive leased a portion of the capped landfill to extend their new car lot. The construction of this car lot was conducted under the oversight and knowledge of the EPA and involved the addition of crushed stone and asphalt cover to the top of the northernmost portion of the landfill. The solidified contents of the landfill were not disturbed by these activities. The collective efforts of Hercules, EPA, and Nalley Automotive have resulted in a productive re-use of the capped landfill that adds additional layers of protectiveness to the original remedy.

In 2010 EPA asked Hercules to delineate the BTEX downgradient from N-5 on property owned by Ameris. Hercules installed temporary wells and collected 26 groundwater samples from shallow temporary wells and 12 samples from deep temporary wells on the Ameris property. Benzene was detected at concentrations above the EPA MCL in six (6) of the shallow temporary well samples and in four (4) of the deep temporary well samples. Subsequently, Hercules proposed to install permanent wells on the Ameris property to be incorporated into the monitoring program, and sought permission from the owner in early 2012. In February 2012, Ameris Bank declined the Hercules request for access to install. Hercules then notified EPA that it was unable to reach an agreement to install these wells. EPA agreed that Hercules could continue with current monitoring program.

4.0 FIELD ACTIVITIES

On May 17 through 18, 2012, Antea Group measured depth-to-groundwater in monitoring wells N-1, N-2, N-3, N-5, N-6SR, N-6DR, N-7, N-8, N-9S, N-9D, N-10, N-12, N-13, N-14S, N-14D, N-15S, and N-15D. The depth-to-groundwater was measured in each well using a decontaminated electronic water-level probe. After gauging depth-to-groundwater, Antea Group collected groundwater samples from monitoring wells N-5, N-6DR, N-7, N-10, N-12, N-15S, and N-15D. Low-flow sampling techniques were used to purge the wells until field parameters stabilized. Purge water was containerized in labeled 55-gallon steel drums and staged on-site for subsequent disposal. New nitrile gloves were worn during sampling of each well to minimize the potential for cross-contamination during the sampling process. Field measurements of pH, electrical conductivity, dissolved oxygen, oxygen reduction potential, turbidity, and temperature were collected from the groundwater samples during these activities. Groundwater sampling records summarizing the field measurements are included in **Appendix A**.

Following purging of the monitoring wells, groundwater samples were collected in laboratory-supplied containers, placed into an ice-filled cooler, and transported under chain-of-custody to Georgia certified laboratories. At the laboratory, the groundwater samples were analyzed for benzene by SW-846 Method 8260B, toxaphene by SW-846 Method 8081, and total suspended solids (TSS) by Standard Method 2540D. Groundwater sampling procedures, analytical methods and quality assurance/quality control (QA/QC) procedures were followed as described in the *Field Branches Quality System and Technical Procedures* issued by the EPA, Science and Ecosystem Support Division *(ref: http://www.epa.gov/region4/sesd/fbqstp/)*. Extracts from the toxaphene samples were sent by Pace analytical to the Ashland Research Center in Wilmington Delaware for toxaphene congener analysis.

5.0 GROUNDWATER FLOW

Groundwater flow direction in the surficial aquifer was evaluated by development of a shallow water table contour map (**Figure 2**) based on depth-to-groundwater measurements obtained from the monitoring wells on May 17

through 18, 2012 (**Table 1**). Review of **Table 1** indicates that monitoring wells N-3, N-6DR, N-7, N-8, N-9D, N-10, N-14D, and N-15D are screened deeper in the aquifer. As a result, the wells were not used to generate the contour map. The shallow water table across the site flows generally to the east. This direction of groundwater flow is consistent with flow directions inferred from data obtained during previous depth-to-groundwater gauging events.

Interpretation of the water table contour map suggests that the average horizontal water table gradient is 0.0054 feet per foot (ft/ft) as measured from monitoring wells N-15S to N-5 and N-13 to N-6SR. The vertical hydraulic gradients were calculated at well pairs N-6SR/N-6DR, N-14S/N-14D and N-15S/N-15D. The hydraulic gradients between the well pairs ranged between negative (-) 0.0474 to -0.0828 feet/foot. The negative values indicate downward groundwater flow. Hydraulic gradient calculations are presented in **Appendix B.**

The linear groundwater flow velocity was estimated from the modified Darcy equation:

$$V = \frac{K\,(i)}{n}$$

Where:

V = Average Linear Flow Velocity
K = Average Hydraulic Conductivity
i = Horizontal hydraulic gradient
n = Estimated Effective Porosity (0.25 cm^3_{void}/cm^3_{soil} or 25%)

Based on the average site horizontal hydraulic gradient of 0.0054 ft/ft and an average hydraulic conductivity of 5.7 feet/day, the groundwater flow velocity for the shallow aquifer at the site is estimated to be 1.2312 x 10-1 feet/day, or approximately 44.9 feet/year.

6.0 LABORATORY ANALYTICAL RESULTS

The laboratory analytical report and chain-of-custody record for the groundwater samples are included in **Appendix C** and the results are summarized in **Table 2**. As summarized, toxaphene was not detected in groundwater samples collected from monitoring wells N-5, N-6DR, N-7, N-10, N-12, N-15S, or N-15D at concentrations above the laboratory method detection limit (MDL). This data indicates that the implemented remedy continues to be protective of groundwater quality in the vicinity of the site with respect to toxaphene.

Toxaphene is made by reacting chlorine gas with camphene. The resulting product (toxaphene) is a mixture of hundreds of different chlorinated camphenes and related chemicals. According to the laboratory analytical report, chlorinated camphenes were not detected in the groundwater samples collected from monitoring wells N-5, N-

6DR, N-7, N-10, N-12, N-15S, or N-15D at concentrations above the laboratory MDL. The toxaphene congeners report is included in **Appendix C**.

Results from the 2012 annual sampling event indicate that benzene was detected in the groundwater sample collected from monitoring well N-5 at a concentration of 710 micrograms per liter (µg/L), which exceeds its EPA Maximum Contaminant Level (MCL) of 5 µg/L. As shown on **Figure 3**, benzene concentrations have continued to fluctuate, but show an overall downward trend. Since 2000 Benzene concentrations have fluctuated between 710 ug/L to 0.65 ug/L. Historical analytical results for monitoring wells N-5, N-6DR, N-7, N-10, N-12, N-15S, and N-15D are presented in **Appendix D**.

7.0 ANNUAL INSPECTION SUMMARY

On May 18, 2011, Antea Group conducted an inspection of the landfill cover, security fencing, and other significant post-closure features. The monitoring well network remains in good repair. The vegetative cover of the landfill has been maintained and is in good condition. All security fencing is intact and in good repair. Storm water catch basins installed in 2005 as part of the expansion of the car dealer lot are in good repair and appear to have not compromised the integrity of the landfill cover materials.

8.0 CONCLUSIONS

Based on the field activities and laboratory analytical results, Antea Group concludes that:

- The shallow water table across the site flows generally to the east.
- Chlorinated camphenes were not detected in the groundwater samples collected from monitoring wells N-5, N-6DR, N-7, N-10, N-12, N-15S, and N-15D at concentrations above the laboratory MDL.
- Toxaphene was not detected in groundwater samples collected from monitoring wells N-5, N-6DR, N-7, N-10, N-12, N-15S, and N-15D at concentrations above the laboratory MDL. The implemented remedy remains protective of the groundwater with respect to toxaphene.
- Toxaphene Congeners were non-detect in all wells for the first time since the congener monitoring program was implemented.
- Benzene was detected in the groundwater sample collected from monitoring well N-5 at a concentration which exceeds its EPA MCL.
- The monitoring well network remains in good repair. The vegetative cover of the landfill has been maintained and is in good condition. All security fencing is intact and in good repair. Storm water catch basins installed in 2005 as part of the expansion of the car dealer lot are in good repair have not compromised the integrity of the landfill cover materials.

9.0 RECOMMENDATIONS AND FUTURE WORK

Based on the above conclusions, Antea Group recommends:

- Continue to monitor groundwater conditions per O&M plan in monitoring wells N-5, N-6DR, N-7, N-10, N-12, N-15S, and N-15D on an annual schedule.
- Monitor toxaphene congeners for one more event to confirm trend.

10.0 REMARKS

The recommendations contained in this report represent Antea USA, Inc.'s professional opinions based upon the currently available information and are arrived at in accordance with currently accepted professional standards. This report is based upon a specific scope of work requested by the client. The contract between Antea USA, Inc. and its client outlines the scope of work, and only those tasks specifically authorized by that contract or outlined in this report were performed. This report is intended only for the use of Antea USA, Inc.'s client and anyone else specifically identified in writing by Antea USA, Inc. as a user of this report. Antea USA, Inc. will not and cannot be liable for unauthorized reliance by any other third party. Other than as contained in this paragraph, Antea USA, Inc. makes no express or implied warranty as to the contents of this report.

Gary C. Ribblett — 06/03/2013

Gary C. Ribblett — Date
Project Manager

06/03/2013

Dennis Brunner, P.G. — Date
Georgia Licensed Geologist #00714

cc: Mr. Tim Hassett – Hercules Incorporated, Wilmington, DE
E. Williams – GA EPD, Atlanta, GA
D. S. Parshley – Glynn County Environmental Coalition, Brunswick, GA

Tables

Table 1
Groundwater Elevation Data
Hercules 009 Landfill
Brunswick, GA
EPA ID No. GAD980556906
Antea Group Project No. WBS23413L1

Well ID	Date	Total Depth (FT TOC)	TOC Elevation (FT MSL)	Depth to Water (FT TOC)	Water Elevation (FT MSL)	Screen Interval (FT MSL)	Zone Screened
N-1	05/11/11	30.00	23.87	9.81	14.06	-4.70 to -9.70	Shallow
	05/18/12	30.00	23.87	10.11	13.76	-4.70 to -9.70	Shallow
N-2	05/11/11	25.00	23.40	10.61	12.79	0.10 to -4.90	Shallow
	05/18/12	25.00	23.40	11.17	12.23	0.10 to -4.90	Shallow
N-3	05/11/11	35.30	25.00	10.39	14.61	-8.60 to -13.60	Intermediate
	05/18/12	35.30	25.00	10.43	14.57	-8.60 to -13.60	Intermediate
N-5	05/11/11	25.00	24.41	9.99	14.42	0.60 to -4.40	Shallow
	05/18/12	25.00	24.41	10.43	13.98	0.60 to -4.40	Shallow
N-6SR	05/11/11	28.50	20.10	8.49	11.61	-3.40 to -8.40	Shallow
	05/18/12	28.50	20.10	9.48	10.62	-3.40 to -8.40	Shallow
N-6DR	05/11/11	88.20	20.20	14.07	6.13	-55.60 to -65.60	Deep
	05/18/12	88.20	20.20	14.11	6.09	-55.60 to -65.60	Deep
N-7	05/11/11	90.00	22.92	14.84	8.08	-64.00 to -69.00	Deep
	05/18/12	90.00	22.92	13.74	9.18	-64.00 to -69.00	Deep
N-8	05/11/11	83.00	22.56	13.59	8.97	-61.40 to -63.40	Deep
	05/18/12	83.00	22.56	13.62	8.94	-61.40 to -63.40	Deep
N-9S	05/11/11	--	22.10	9.21	12.89	--	Shallow
	05/18/12	--	22.10	9.98	12.12	--	Shallow
N-9D	05/11/11	--	21.92	13.09	8.83	--	Deep
	05/18/12	--	21.92	13.09	8.83	--	Deep
N-10	05/11/11	87.00	21.90	13.33	8.57	-62.80 to -67.80	Deep
	05/18/12	87.00	21.90	13.34	8.56	-62.80 to -67.80	Deep
N-11	05/11/11	32.00	22.40	NM	NM	-2.09 to -12.09	Shallow
	05/18/12	32.00	22.40	10.09	NM	-2.09 to -12.09	Shallow
N-12	05/11/11	16.00	25.33	11.82	13.51	15.90 to 5.90	Shallow
	05/18/12	16.00	25.33	12.95	12.38	15.90 to 5.90	Shallow
N-13	05/11/11	32.00	24.70	10.08	14.62	-1.18 to -11.18	Shallow
	05/18/12	32.00	24.70	10.96	13.74	-1.18 to -11.18	Shallow

Table 1
Groundwater Elevation Data
Hercules 009 Landfill
Brunswick, GA
EPA ID No. GAD980556906
Antea Group Project No. WBS23413L1

Well ID	Date	Total Depth (FT TOC)	TOC Elevation (FT MSL)	Depth to Water (FT TOC)	Water Elevation (FT MSL)	Screen Interval (FT MSL)	Zone Screened
N-14S	05/11/11	16.60	19.26	6.65	12.61	12.48 to 2.48	Shallow
	05/18/12	16.60	19.26	7.33	11.93	12.48 to 2.48	Shallow
N-14D	05/11/11	87.80	19.61	11.04	8.57	-58.46 to -68.46	Deep
	05/18/12	87.80	19.61	11.04	8.57	-58.46 to -68.46	Deep
N-15S	05/11/11	16.80	20.17	4.68	15.49	16.72 to 6.72	Shallow
	05/17/12	16.80	20.17	5.23	14.94	16.72 to 6.72	Shallow
N-15D	05/11/11	78.70	21.12	9.29	11.83	-44.52 to -54.52	Deep
	05/17/12	78.70	21.12	9.81	11.31	-44.52 to -54.52	Deep

Notes:

Feet below Top of Casing (TOC)

eet above Mean Sea Level (MSL)

easured; well plug lodged in casing

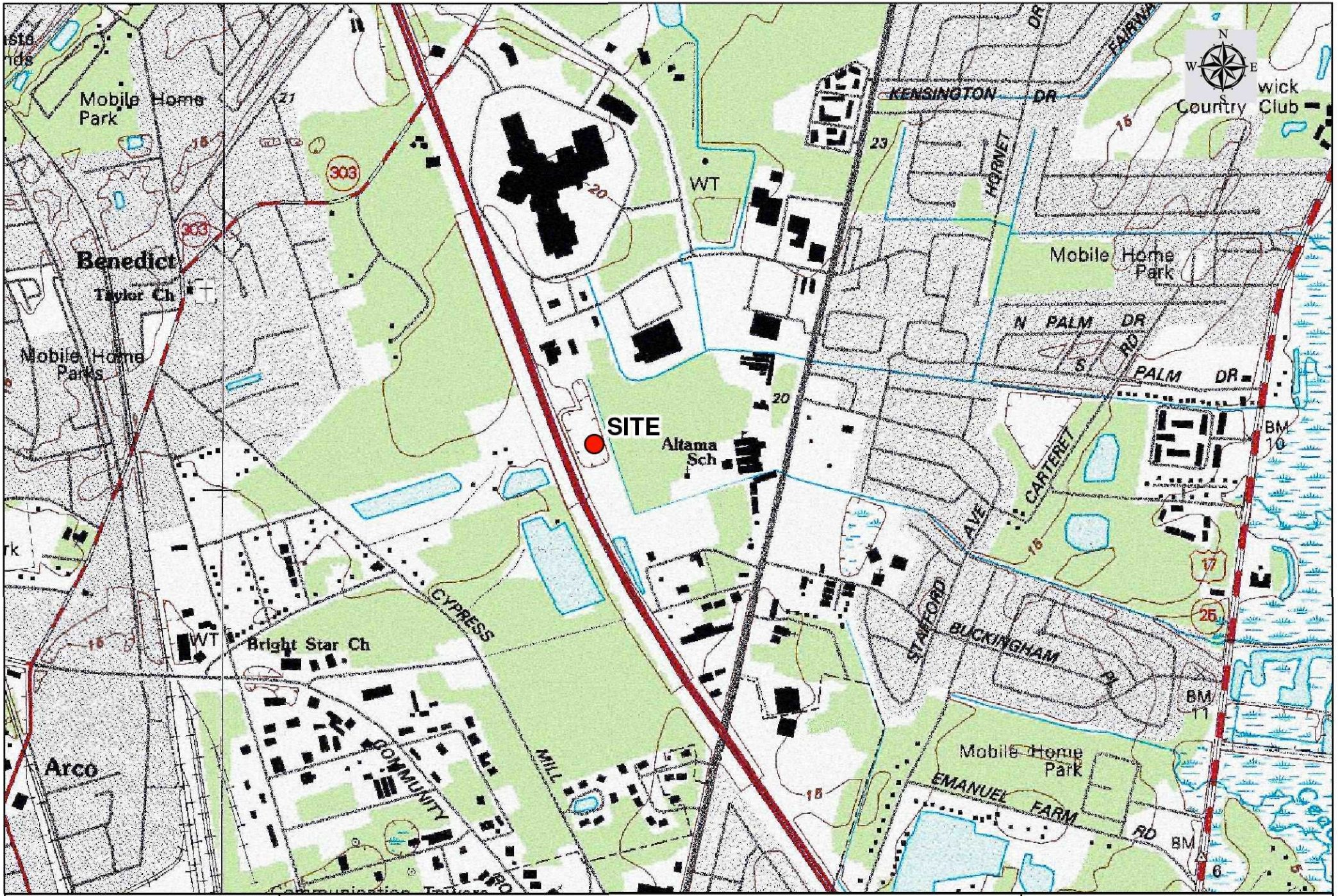
-- - Data not available

Table 2
Groundwater Analytical Data
Hercules 009 Landfill
Brunswick, GA
EPA ID No. GAD980556906
Antea Group Project No. WBS23413L1

Chemical Name		Benzene	Total Suspended Solids	Toxaphene	Chlorinated Camphenes	Dissolved Iron	Sulfate	Nitrate
MCL		5.0	--	3.0	--			
Report Units:		ug/L	mg/L	ug/L	ug/L	mg/L	mg/L	mg/L
Well ID	**Sampling Date**							
N-5	05/11/2011	**340**	12	<0.56	<0.56	--	--	--
	05/18/2012	**710**	<5.0	<0.48	<0.48	1.8	<5.0	<0.050
N-6DR	05/11/2011	<0.25	22	<0.56	<0.56	--	--	--
	05/18/2012	<1.0	<5.0	<0.49	<0.49	--	--	--
N-7	05/11/2011	<0.25	8.0	<0.53	<0.53	--	--	--
	05/18/2012	0.49J	<5.0	<0.48	<0.48	31	17	<0.050
N-10	05/11/2011	<0.25	13	<0.55	<0.55	--	--	--
	05/18/2012	<1.0	<5.0	<0.47	<0.47	--	--	--
N-12	05/11/2011	0.33J	9.0	<0.54	<0.54	--	--	--
	05/18/2012	0.32J	10	<0.48	<0.48	--	--	--
N-15S	05/11/2011	<0.25	46	<0.54	<0.54	--	--	--
	05/18/2012	<1.0	<5.0	<0.49	<0.49	0.079	5.7	<0.050
N-15D	05/11/2011	<0.25	16	<0.58	<0.58	--	--	--
	05/18/2012	<1.0	<5.0	<0.46	<0.46	1.4	14	<0.050
Duplicate (N-5)	05/11/2011	**320**	11	<0.58	<0.58	--	--	--
	05/18/2012	**600**	5.0	<0.48	<0.48	1.8	<5.0	<0.050
Equipment Blank	05/11/2011	<0.25	--	--	--	--	--	--
Equipment Blank 1	05/18/2012	<1.0	--	--	--	--	--	--
Equipment Blank 2	05/18/2012	<1.0	--	--	--	--	--	--
Trip Blank	05/11/2011	<0.25	--	--	--	--	--	--
	05/18/2012	<1.0	--	--	--	--	--	--

Notes:
t Level (National Primary Drinking Water Standards)
:sults in Bold exceed MCL
r above indicated laboratory reporting limit
JG/L - micrograms/liter
:qual to the method detection limit and the concentration is an approximate value

Figures



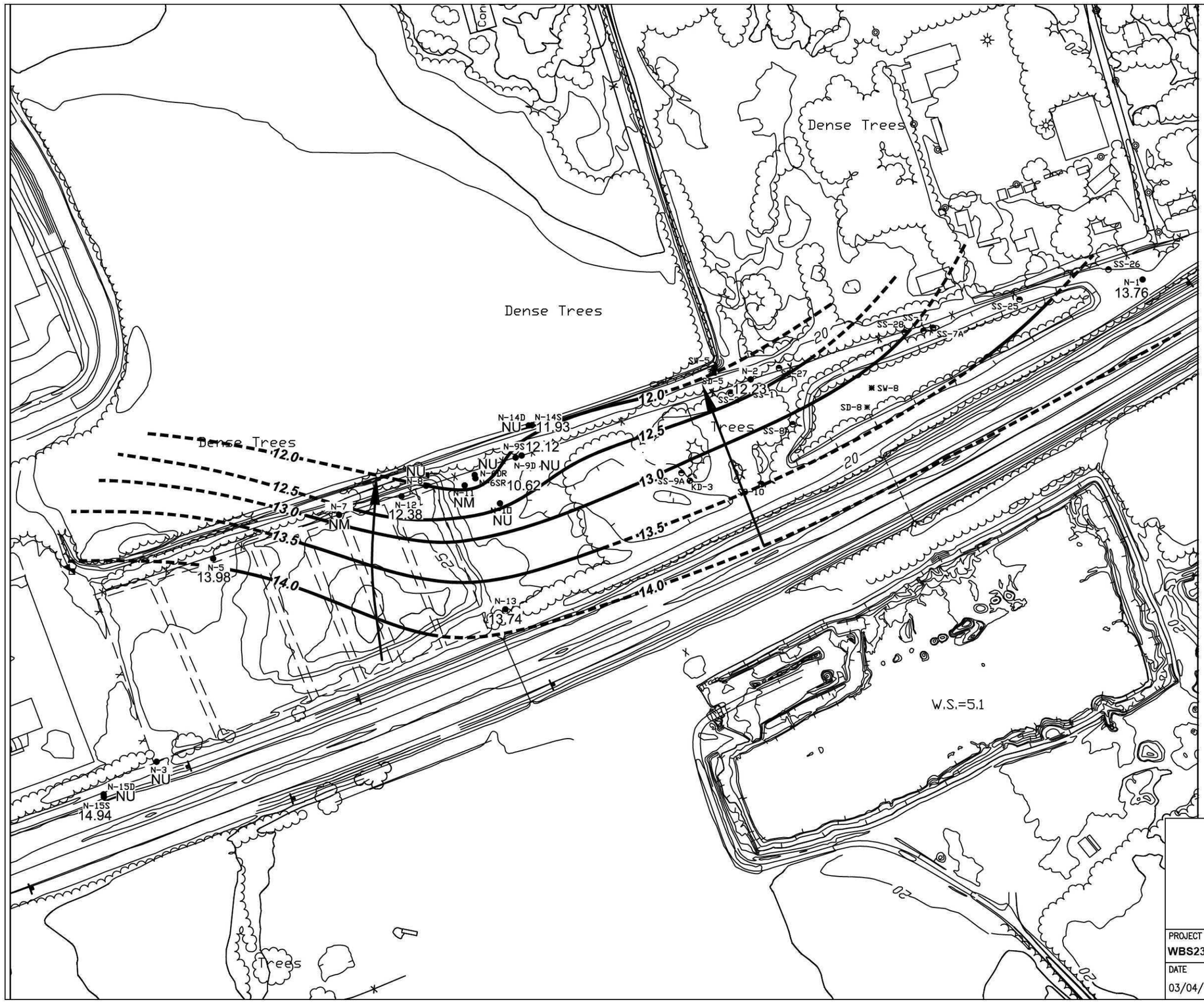
Map Location

Hercules 009 Landfill
Brunswick, Georgia
EPA ID: GAD980556906
Site Location Map
Source: Topographic Map provided by USDA

Created By:Amy Uebele
Reviewed By:Doug Rowles

anteagroup

Figure:1
Date: 02-27-2013
Project Number: **WBS23413L1**



LEGEND

- N-1 13.76 — MONITORING WELL WITH GROUNDWATER ELEVATION MEASURED IN FEET ABOVE MEAN SEA LEVEL
- N-10 NU — DEEP MONITORING WELL NOT USED IN CONTOURING
- N-11 NM — MONITORING WELL NOT MEASURED OR USED IN CONTOURING
- —13.0— GROUNDWATER ELEVATION CONTOUR LINE, DASHED WHERE INFERRED (CONTOUR INTERVAL=0.5-FOOT)
- GROUNDWATER FLOW DIRECTION
- CELL BOUNDARY
- FENCE

North

0 250

SCALE IN FEET

BASED ON RMT PLATE 1 DATED NOVEMBER 2004

FIGURE 2
SHALLOW WATER TABLE CONTOUR MAP
MAY 18, 2012
HERCULES 009 LANDFILL
BRUNSWICK, GEORGIA
EPA ID: GAD980556906

PROJECT NO.	PREPARED BY	DRAWN BY	
WBS23413L1	MM	MM	
DATE	REVIEWED BY	FILE NAME	
03/04/13	MD		

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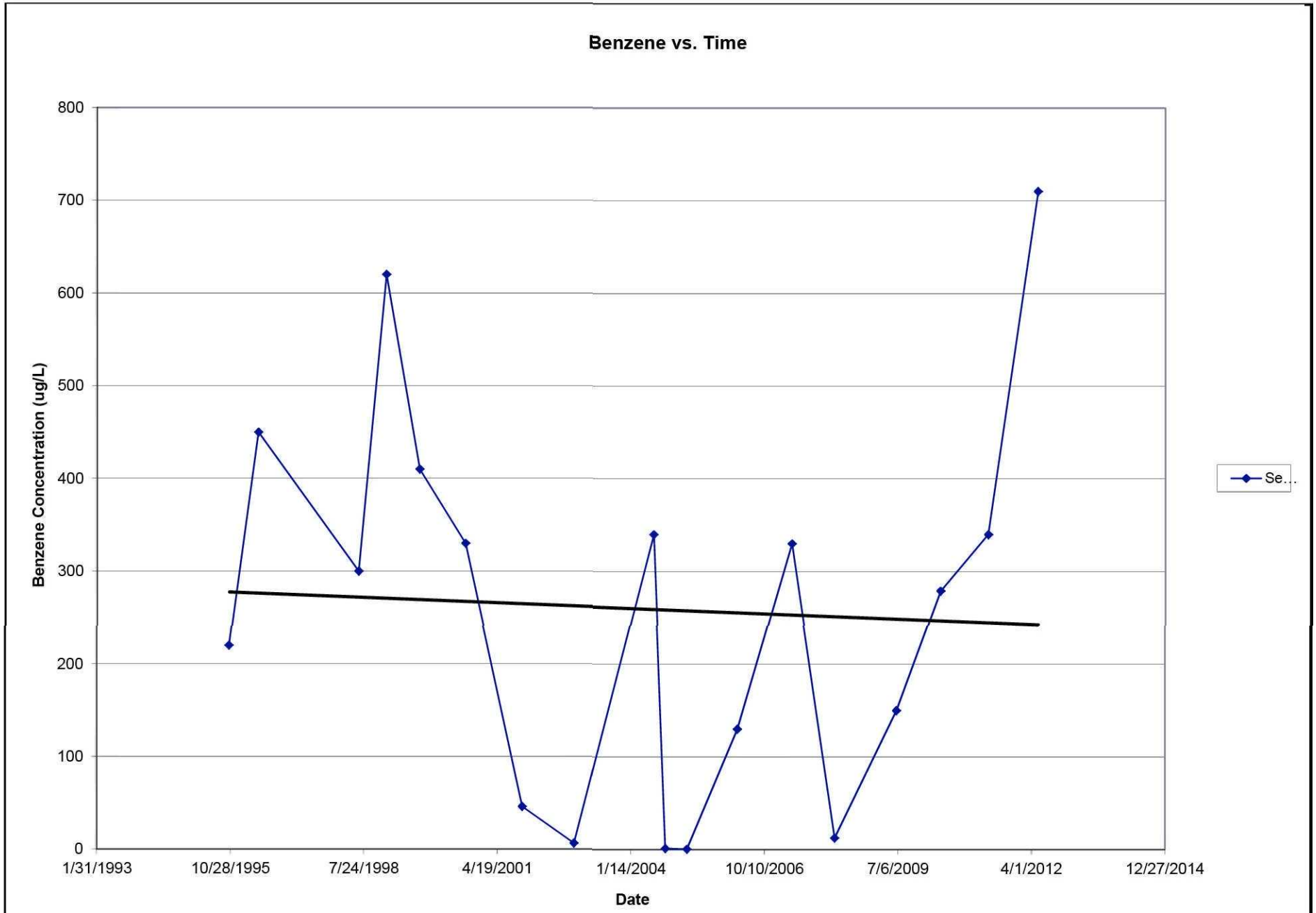

FIGURE 3 - BENZENE VS. TIME GRAPH

Monitoring Well N-5
Hercules 009 Landfill
Brunswick, Georgia
EPA ID: GAD980556906

PROJECT NO:	WBS23413L1
DATE:	2/28/2013
DWN:	TB
CKD:	KS
APPD:	

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Appendix A

Groundwater Sampling Records

Operation & Maintenance Checklist (OMC)

Hercules 009 Landfill

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Y = Yes, N = No, G = Good, F = Fair P = Poor NA = Not Applicable

Monitoring Well	Well On or Off Site	Flush Mount? (Y/N)	Standing Water in Vault? (Y/N)	All Bolts, washers & Seals? (Y/N)	Concrete Pad? (Y/N)	Condition of Pad (G/F/P/NA)	Vegetation Near Well (G/F/P)	Stickup Integrity (G/F/P/NA)	Lock Condition (G/F/P/NA)	Hinge Condition (G/F/P/NA)	Plug or Cap Condition (G/F/P/NA)	Water Level Mark Visible? (Y/N)	Comments or Corrective Action	Date C/A Completed	Done by: (initials)
N-1	On	N	NA	NA	N	NA	G	G	G	NA	G	Y			
N-2	On	N	NA	NA	N	NA	G	G	G	NA	G	Y			
N-3	On	N	NA	NA	N	NA	G	G	G	NA	G	Y			
N-5	On	N	NA	NA	N	NA	G	G	G	NA	G	Y			
N-65R	On	N	NA	NA	Y	G	G	G	G	P	G	Y	Cap hinge rusted off		
N-6DR	On	N	NA	NA	Y	G	G	G	G	F	G	Y	Cap hinge quite rusty		
N-7	On	N	NA	NA	Y	F	G	G	G	NA	G	Y			
N-8	On	N	NA	NA	Y	G	G	G	G	NA	G	Y			
N-9S	On	N	NA	NA	Y	G	G	G	G	NA	G	Y			
N-9D	On	N	NA	NA	Y	G	G	G	G	NA	G	Y			
N-10	On	N	NA	NA	Y	G	G	G	G	NA	G	Y			
N-11	On	N	NA	NA	Y	G	G	G	G	G	G	Y			
N-12	On	N	NA	NA	Y	G	G	G	G	G	G	Y			
N-13	On	N	NA	NA	N	NA	G	G	G	G	G	Y			
N-14S	Off	N	NA	NA	Y	G	G	G	G	G	G	Y			
N-14D	Off	N	NA	NA	Y	G	G	G	G	G	G	Y			
N-15S	Off	Y	N	Y	Y	G	G	NA	NA	NA	G	Y			
N-15D	Off	Y	N	Y	Y	G	G	NA	NA	NA	G	Y			

Xinogen

DATE OF INSPECTION: 5-18-12 INSPECTOR (Print Name) Marty Mullis SIGNATURE: Marty Mullis

Monitoring Well	Total Depth	Depth to Water	Time	Date
N-1	30.00	10.11	0740	5-18-12
N-2	24.99	11.07	0710	5-18-12
N-3	35.31	10.43	0738	"
N-5	25.00		0745	"
N-6SR	28.50	9.48	0721	"
N-6DR	88.19	14.11	0722	"
N-7	90.00		0724	"
N-8	83.01	13.62	0726	"
N-9S		9.98	0715	"
N-9D		13.09	0714	"
N-10	86.99	13.34	0719	"
N-11	32.01	10.09	0724	"
N-12	16.00	12.95	0728	"
N-13	32.00	10.96	0731	"
N-14S	16.61	7.33	0716	"
N-14D	87.80	11.04	0717	"
N-15S	16.80	5.23	1258	5-17-12
N-15D	78.70	9.81	1259	5-17-12

GROUNDWATER SAMPLING LOG

SITE NAME:	Hercules 009 Landfill	SITE LOCATION:	Brunswick, GA
WELL ID:	N-06DR	DATE:	5-18-12

PURGING DATA

WELL DIAMETER (inches): 2	WELL SCREEN INTERVAL DEPTH: FTMSL feet to -55.60 feet 65.60	STATIC DEPTH TO WATER (feet): 14.11	PURGE PUMP TYPE OR BAILER: Monsoon

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)

= _____ liters + (0.0217 liters/foot X 75 feet) + 0.5 liters = 1.22 liters

TIME	VOLUME PURGED (liters)	CUMUL. VOLUME PURGED (liters)	PURGE RATE (L/min)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (µmhos/cm or µS/cm)	DISS. OXYGEN (mg/L)	TURBIDITY (NTUs)	OXYGEN REDUCTION POTENTIAL (mV)
	no [illegible]		0.3							
	↓		↓							
0810	1.2	1.2	0.3	14.11	5.23	21.65	1334	0.31	1.68	-16.9
0813	0.9	2.1	↓	14.13	5.20	21.70	1338	0.27	2.03	-17.8
0816	0.9	3.0		14.14	5.21	21.74	1338	0.21	1.97	-20.5
0819	0.9	3.9		14.14	5.21	21.75	1338	0.23	1.86	-19.4

TUBING INSIDE DIA. CAPACITY (Liters/Ft.): 1/8" = 0.0024; 3/16" = 0.0054; 1/4" = 0.0097; 5/16" = 0.0151; 3/8" = 0.0217; 1/2" = 0.0386; 5/8" = 0.0603

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURES:	SAMPLING TIME:
Marty Mullis / Antea Group	Marty Mullis	0820

FIELD DECONTAMINATION: (Y) N	FIELD-FILTERED: Y N FILTER SIZE: ____ µm Filtration Equipment Type: _____	DUPLICATE: Y (N)

SAMPLE CONTAINER SPECIFICATION		SAMPLE PRESERVATION	INTENDED ANALYSIS AND/OR METHOD
# CONTAINERS	VOLUME	PRESERVATIVE USED	
3	40mL	HCL	8260-Benzene
1	500mL	—	2540D - TSS
2	1L	—	8081-Toxaphene

REMARKS:

NOTES: 1. STABILIZATION CRITERIA FOR THREE CONSECUTIVE WATER QUALITY READINGS

Turbidity:	<10 NTU
Temp.:	<0.5 Degrees C
pH:	<0.1 SU
Specific Conductance:	10%
Drawdown:	<0.5 ft from Initial
Dissolved Oxygen:	<0.5 mg/L

GROUNDWATER SAMPLING LOG

SITE NAME:	Hercules 009 Landfill	SITE LOCATION:	Brunswick, GA
WELL ID:	N-10	DATE:	5-18-12

PURGING DATA

WELL DIAMETER (inches): 2	WELL SCREEN INTERVAL DEPTH: FT MSL feet to -62.80 feet -67.80	STATIC DEPTH TO WATER (feet): 13.34	PURGE PUMP TYPE OR BAILER: Monsoon

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)

= _____ liters + (.0097 liters/foot X 80 feet) + 1.5 liters = 1.28 liters

TIME	VOLUME PURGED (liters)	CUMUL. VOLUME PURGED (liters)	PURGE RATE (L/min)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (µmhos/cm or mS/cm)	DISS. OXYGEN (mg/L)	TURBIDITY (NTUs)	OXYGEN REDUCTION POTENTIAL (mV)
0855	1.5	1.5	0.3	13.34	4.85	21.80	1295	1.30	3.22	-55.3
0858	0.9	2.4	↓	13.36	4.90	21.91	1305	1.51	4.03	-55.0
0901	0.9	3.3	↓	13.36	4.91	21.97	1310	1.42	3.97	-69.7
0904	0.9	4.2	↓	13.38	4.92	22.04	1317	1.26	3.64	-68.9

TUBING INSIDE DIA. CAPACITY (Liters/Ft.): **1/8"** = 0.0024; **3/16"** = 0.0054; **1/4"** = 0.0097; **5/16"** = 0.0151; **3/8"** = 0.0217; **1/2"** = 0.0386; **5/8"** = 0.0603

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Marty Mullis / Antea Group	SAMPLER(S) SIGNATURES: Marty Mullis	SAMPLING TIME: 0905
FIELD DECONTAMINATION: (Y) N	FIELD-FILTERED: Y (N) FILTER SIZE: ____ µm Filtration Equipment Type:	DUPLICATE: Y (N)

SAMPLE CONTAINER SPECIFICATION		SAMPLE PRESERVATION	INTENDED ANALYSIS AND/OR METHOD
# CONTAINERS	VOLUME	PRESERVATIVE USED	
3	40mL	HCL	8260 - Benzene
1	500mL	—	25400 - TSS
2	1L	—	8081 - Toxaphene

REMARKS:

NOTES: 1. STABILIZATION CRITERIA FOR THREE CONSECUTIVE WATER QUALITY READINGS

Turbidity:	<10 NTU
Temp.:	<0.5 Degrees C
pH:	<0.1 SU
Specific Conductance:	10%
Drawdown:	<0.5 ft from Initial
Dissolved Oxygen:	<0.5 mg/L

GROUNDWATER SAMPLING LOG

SITE NAME: Hercules 009 Landfill	SITE LOCATION: Brunswick, GA
WELL ID: N-12	DATE: 5-18-12

PURGING DATA

WELL DIAMETER (inches): 2	WELL SCREEN INTERVAL DEPTH: FT MSL feet to 15.9 feet 5.90	STATIC DEPTH TO WATER (feet): 12.95	PURGE PUMP TYPE OR BAILER: Peristaltic

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)

= _____ liters + (.0097 liters/foot X 17 feet) + .5 liters = 0.66 liters

TIME	VOLUME PURGED (liters)	CUMUL. VOLUME PURGED (liters)	PURGE RATE (L/min)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (µmhos/cm or mS/cm)	DISS. OXYGEN (mg/L)	TURBIDITY (NTUs)	OXYGEN REDUCTION POTENTIAL (mV)
0945	0.7	0.7	0.1	12.95	6.60	21.87	1725	1.59	6.82	-78.0
0948	0.3	1.0	↓	12.98	6.59	21.91	1723	1.44	5.97	-87.9
0951	0.3	1.3		13.01	6.59	21.92	1724	1.39	6.13	-87.6
0954	0.3	1.6		13.02	6.58	21.92	1724	1.38	6.27	-86.1

TUBING INSIDE DIA. CAPACITY (Liters/Ft.): **1/8"** = 0.0024; **3/16"** = 0.0054; **1/4"** = 0.0097; **5/16"** = 0.0151; **3/8"** = 0.0217; **1/2"** = 0.0386; **5/8"** = 0.0603

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Marty Mullis / Antea Group	SAMPLER(S) SIGNATURES: Marty Mullis	SAMPLING TIME: 0955
FIELD DECONTAMINATION: N/A (Y) (N)	FIELD-FILTERED: Y (N) FILTER SIZE: ____ µm Filtration Equipment Type: _____	DUPLICATE: Y (N)

SAMPLE CONTAINER SPECIFICATION		SAMPLE PRESERVATION	INTENDED ANALYSIS AND/OR METHOD
# CONTAINERS	VOLUME	PRESERVATIVE USED	
3	40mL	HCl	8260 - Benzene
1	500mL	—	2540D - TSS
2	1L	—	8081 - Toxaphene

REMARKS: Slight yellow in color

NOTES: 1. STABILIZATION CRITERIA FOR THREE CONSECUTIVE WATER QUALITY READINGS

Turbidity:	<10 NTU
Temp.:	<0.5 Degrees C
pH:	<0.1 SU
Specific Conductance:	10%
Drawdown:	<0.5 ft from Initial
Dissolved Oxygen:	<0.5 mg/L

GROUNDWATER SAMPLING LOG

SITE NAME: Hercules 009 Landfill	SITE LOCATION: Brunswick, GA
WELL ID: N-155	DATE: 5-18-12

PURGING DATA

WELL DIAMETER (inches): 2	WELL SCREEN INTERVAL DEPTH: feet to 16.72 feet 6.72	STATIC DEPTH TO WATER (feet): 5.23	PURGE PUMP TYPE OR BAILER: Peristaltic

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)

= _____ liters + (.0152 liters/foot X 16 feet) + .5 liters = 0.66 liters

TIME	VOLUME PURGED (liters)	CUMUL. VOLUME PURGED (liters)	PURGE RATE (L/min)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (µmhos/cm or µS/cm)	DISS. OXYGEN (mg/L)	TURBIDITY (NTUs)	OXYGEN REDUCTION POTENTIAL (mV)
1105	1.0	1.0	0.1	5.24	5.96	22.58	51	1.32	13.4	75.9
1108	0.3	1.3		5.27	5.91	22.62	46	1.26	8.65	81.8
1111	0.3	1.6		5.28	5.90	22.62	45	1.31	7.92	82.0
1114	0.3	1.9		5.28	5.89	22.64	48	1.30	8.03	82.5

TUBING INSIDE DIA. CAPACITY (Liters/Ft.): **1/8"** = 0.0024; **3/16"** = 0.0054; **1/4"** = 0.0097; **5/16"** = 0.0151; **3/8"** = 0.0217; **1/2"** = 0.0386; **5/8"** = 0.0603

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Marty Mullis / Antea Group	SAMPLER(S) SIGNATURES:	SAMPLING TIME: 1115
FIELD DECONTAMINATION: Y (N)	FIELD-FILTERED: Y (N) FILTER SIZE: _____ µm Filtration Equipment Type:	DUPLICATE: Y (N)

SAMPLE CONTAINER SPECIFICATION		SAMPLE PRESERVATION	INTENDED ANALYSIS AND/OR METHOD
# CONTAINERS	VOLUME	PRESERVATIVE USED	
3	40mL	HCL	8260B - Benzene
1	500mL	—	2540D - TSS
1	125mL	—	Sulfate
1	125mL	—	353.2 - Nitrate
1	125mL	Sulfuric Acid	353.2 - Nitrate
1	250mL	—	6010B - Dissolved Iron
2	1L	—	8081 - Toxaphene

REMARKS:

NOTES: 1. STABILIZATION CRITERIA FOR THREE CONSECUTIVE WATER QUALITY READINGS

Turbidity:	<10 NTU
Temp.:	<0.5 Degrees C
pH:	<0.1 SU
Specific Conductance:	10%
Drawdown:	<0.5 ft from Initial
Dissolved Oxygen:	<0.5 mg/L

GROUNDWATER SAMPLING LOG

SITE NAME:	Hercules 009 Landfill	SITE LOCATION:	Brunswick, GA
WELL ID:	N-15D	DATE:	5-18-12

PURGING DATA

WELL DIAMETER (inches): 2	WELL SCREEN INTERVAL DEPTH: FT MSL feet to -44.52 feet -54.52	STATIC DEPTH TO WATER (feet): 9.81	PURGE PUMP TYPE OR BAILER: Monsoon

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)

= _____ liters + (.0097 liters/foot X 75 feet) + 5 liters = 1.23 liters

TIME	VOLUME PURGED (liters)	CUMUL. VOLUME PURGED (liters)	PURGE RATE (L/min)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (µmhos/cm or µS/cm)	DISS. OXYGEN (mg/L)	TURBIDITY (NTUs)	OXYGEN REDUCTION POTENTIAL (mV)
1149	1.5	1.5	0.3	9.81	5.67	23.02	166	1.25	13.9	-152.0
1152	0.9	2.4	↓	9.85	5.68	22.99	172	1.09	8.1	-160.0
1155	0.9	3.3		9.86	5.68	23.01	172	1.07	9.07	-159.6
1158	0.9	4.2		9.86	5.68	23.01	173	1.08	7.08	-157.3

TUBING INSIDE DIA. CAPACITY (Liters/Ft.): **1/8"** = 0.0024; **3/16"** = 0.0054; **1/4"** = 0.0097; **5/16"** = 0.0151; **3/8"** = 0.0217; **1/2"** = 0.0386; **5/8"** = 0.0603

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Marty Mullis / Antea Group	SAMPLER(S) SIGNATURES: Marty Mullis	SAMPLING TIME: 1200
FIELD DECONTAMINATION: (Y) N	FIELD-FILTERED: Y (N) FILTER SIZE: ____ µm Filtration Equipment Type: _____	DUPLICATE: Y (N)

SAMPLE CONTAINER SPECIFICATION		SAMPLE PRESERVATION	INTENDED ANALYSIS AND/OR METHOD
# CONTAINERS	VOLUME	PRESERVATIVE USED	
3	40 mL	HCl	8260B - Benzene
1	500 mL	—	2540D - TSS
1	125 mL	—	Sulfate
1	125 mL	—	353.2 - Nitrate
1	125 mL	Sulfuric Acid	353.2 - Nitrate
1	250 mL	—	6010B - Dissolved Iron
2	1L	—	8081 - Toxaphene

REMARKS:

NOTES: 1. STABILIZATION CRITERIA FOR THREE CONSECUTIVE WATER QUALITY READINGS

Turbidity:	<10 NTU
Temp.:	<0.5 Degrees C
pH:	<0.1 SU
Specific Conductance:	10%
Drawdown:	<0.5 ft from Initial
Dissolved Oxygen:	<0.5 mg/L

GROUNDWATER SAMPLING LOG

SITE NAME:	Hercules 009 Landfill	SITE LOCATION:	Brunswick, GA
WELL ID:	N-07	DATE:	5-18-12

PURGING DATA

WELL DIAMETER (inches): 2	WELL SCREEN INTERVAL DEPTH: FT MSL feet to -64.0 feet 69.0	STATIC DEPTH TO WATER (feet): 13.74	PURGE PUMP TYPE OR BAILER: Monsoon

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)

= _____ liters + (.0097 liters/foot X 85 feet) + .5 liters = 1.32 liters

TIME	VOLUME PURGED (liters)	CUMUL. VOLUME PURGED (liters)	PURGE RATE (L/min)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (µmhos/cm or µS/cm)	DISS. OXYGEN (mg/L)	TURBIDITY (NTUs)	OXYGEN REDUCTION POTENTIAL (mV)
1300	1.30	1.30	0.3	13.75	5.15	23.78	1096	1.49	1.71	-109.2
1303	0.9	2.40	↓	13.79	5.12	23.54	1096	1.37	1.92	-117.8
1306	0.9	3.30		13.79	5.05	23.50	1096	1.32	1.87	-105.1
1309	0.9	4.20		13.81	5.06	23.51	1096	1.28	2.02	-107.2

TUBING INSIDE DIA. CAPACITY (Liters/Ft.): **1/8"** = 0.0024; **3/16"** = 0.0054; **1/4"** = 0.0097; **5/16"** = 0.0151; **3/8"** = 0.0217; **1/2"** = 0.0386; **5/8"** = 0.0603

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Marty Mullis / Antea Group	SAMPLER(S) SIGNATURES: Marty Mullis	SAMPLING TIME: 1310
FIELD DECONTAMINATION: Y N	FIELD-FILTERED: Y (N) FILTER SIZE: ____ µm Filtration Equipment Type:	DUPLICATE: Y (N)

SAMPLE CONTAINER SPECIFICATION		SAMPLE PRESERVATION	INTENDED ANALYSIS AND/OR METHOD
# CONTAINERS	VOLUME	PRESERVATIVE USED	
3	40mL	HCL	8260 - Benzene
1	500mL	—	2540D - TDS
1	125mL	—	Sulfate
1	125mL	—	353.2 - Nitrate
1	125mL	Sulfuric Acid	353.2 - Nitrate
1	250mL	—	6010B - Dissolved Iron
2	1L	—	8081 - Toxaphene

REMARKS:

NOTES: 1. STABILIZATION CRITERIA FOR THREE CONSECUTIVE WATER QUALITY READINGS

Turbidity:	<10 NTU
Temp.:	<0.5 Degrees C
pH:	<0.1 SU
Specific Conductance:	10%
Drawdown:	<0.5 ft from Initial
Dissolved Oxygen:	<0.5 mg/L

GROUNDWATER SAMPLING LOG

SITE NAME:	Hercules 009 Landfill	SITE LOCATION:	Brunswick, GA
WELL ID:	N-05	DATE:	5-18-12

PURGING DATA

WELL DIAMETER (inches): 2	WELL SCREEN INTERVAL DEPTH: FT MSL -4.4 feet to 0.60 feet	STATIC DEPTH TO WATER (feet): 10.43	PURGE PUMP TYPE OR BAILER: Peristaltic

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= _____ liters + (.0097 liters/foot X 28 feet) + .5 liters = 0.77 liters

TIME	VOLUME PURGED (liters)	CUMUL. VOLUME PURGED (liters)	PURGE RATE (L/min)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (µmhos/cm or µS/cm)	DISS. OXYGEN (mg/L)	TURBIDITY (NTUs)	OXYGEN REDUCTION POTENTIAL (mV)
1341	1.0	1.0	0.1	10.45	5.59	24.06	740	1.67	26.8	-167.5
1345	0.3	1.3	"	10.49	5.58	24.08	733	1.53	9.1	-167.2
1348	0.3	1.6	"	10.50	5.58	24.11	732	1.51	5.4	-167.9
1351	0.3	1.9	"	10.51	5.57	24.12	730	1.39	7.3	-168.1

TUBING INSIDE DIA. CAPACITY (Liters/Ft.): 1/8" = 0.0024; 3/16" = 0.0054; 1/4" = 0.0097; 5/16" = 0.0151; 3/8" = 0.0217; 1/2" = 0.0386; 5/8" = 0.0603

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURES:	SAMPLING TIME:
Marty Mullis / Antea Group	Mart Mullis	1355

FIELD DECONTAMINATION: Y (N)	FIELD-FILTERED: Y (N) FILTER SIZE: ____ µm Filtration Equipment Type: _____	DUPLICATE: (Y) N

SAMPLE CONTAINER SPECIFICATION		SAMPLE PRESERVATION	INTENDED ANALYSIS AND/OR METHOD
# CONTAINERS	VOLUME	PRESERVATIVE USED	
3	40mL	HCL	8260B - Benzene
1	500mL	—	2540D - TSS
1	125mL	—	Sulfate
1	125mL	—	353.2 - Nitrate
1	125mL	Sulfuric Acid	353.2 - Nitrate
1	250mL	—	~~200.7~~ 6010B - Dissolved Fe
2	1L	—	8081 - Toxaphene

REMARKS:

NOTES: 1. STABILIZATION CRITERIA FOR THREE CONSECUTIVE WATER QUALITY READINGS

Turbidity:	<10 NTU
Temp.:	<0.5 Degrees C
pH:	<0.1 SU
Specific Conductance:	10%
Drawdown:	<0.5 ft from Initial
Dissolved Oxygen:	<0.5 mg/L

Appendix B

Groundwater Gradient Calculations

Appendix B
Vertical Hydraulic Gradient Calculations
Hercules 009 Landfill
Brunswick, GA
EPA ID No. GAD980556906
Antea Group Project No. WBS23413L1

Monitoring Well Pair	Date	Water Elevation (FT MSL)	H (FT)	Hydraulic Interval Mid-Point (FT MSL)[1]	L (FT)	Hydraulic Gradient (FT/FT)[2]
N-6SR	5/18/2012	10.62	4.53	-5.90	-54.70	-0.0828
N-6DR	5/18/2012	6.09		-60.60		
N-14S	5/18/2012	11.93	3.36	7.48	-70.94	-0.0474
N-14D	5/18/2012	8.57		-63.46		
N-15S	5/17/2012	14.94	3.63	10.83	-60.35	-0.0601
N-15D	5/17/2012	11.31		-49.52		

Notes:

[1] Mid-point interval of the saturated well screen in FT MSL

[2] Hydraulic gradient = $\Delta H/L$

(-) negative represents downward flow

(+) positive represents upward flow

L Length between two saturated hydraulic screen interval midpoints

H Elevation head difference between two wells in well nests (Hd – Hs)

FT MSL Feet above Mean Sea Level (MSL)

FT Feet

Appendix B
Horizontal Hydraulic Gradient Calculations
Hercules 009 Landfill
Brunswick, GA
EPA ID No. GAD980556906
Antea Group Project No. WBS23413L1

Monitoring Well Pair	Date	Water Elevation (FT MSL)	H (FT)	L (FT)	Hydraulic Gradient (FT/FT)[1]
N-15S	5/17/2012	14.94	0.96	660	0.0015
N-5	5/18/2012	13.98			
N-13	5/18/2012	13.74	3.12	335	0.0093
N-6SR	5/18/2012	10.62			
AVERAGE HORIZONTAL HYDRAULIC GRADIENT:					**0.0054**

Notes:

[1] Hydraulic gradient = $\Delta H/L$

L Length (distance) between two wells

H Elevation head difference between two wells

FT MSL Feet above Mean Sea Level (MSL)

Appendix C

Laboratory Analytical Report/Toxaphene Congeners Report

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Savannah
5102 LaRoche Avenue
Savannah, GA 31404
Tel: (912)354-7858

TestAmerica Job ID: 680-79660-1
Client Project/Site: Brunswick 009 Landfill - AQ 5-18-12

For:
Ashland Inc.
Ashland Hercules Research Center
500 Hercules Rd Bldg 8139
Wilmington, Delaware 19808

Attn: Timothy Hassett

Authorized for release by:
5/30/2012 5:57:31 PM

Lidya Gulizia
Project Manager II
lidya.gulizia@testamericainc.com

cc: Gary Ribblett

Table of Contents

Job ID: 680-79660-1

Laboratory: TestAmerica Savannah

Narrative

CASE NARRATIVE

Client: Ashland Inc.

Project: Brunswick 009 Landfill - AQ 5-18-12

Report Number: 680-79660-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

RECEIPT

The samples were received on 05/19/2012; the samples arrived in good condition, properly preserved and on ice. The temperatures of the 2 coolers at receipt time were 0.6º C and 1.4º C.

VOLATILE ORGANIC COMPOUNDS (GC-MS)

Samples N-06DR (680-79660-1), N-10 (680-79660-2), N-12 (680-79660-3), N-15S (680-79660-4), N-15D (680-79660-5), N-07 (680-79660-6), N-05 (680-79660-7), Dup 1 (680-79660-8), Equipment Blank (EB1) (680-79660-9), Equipment Blank (EB2) (680-79660-10) and Trip Blank (680-79660-11) were analyzed for Volatile Organic Compounds (GC-MS) in accordance with EPA SW-846 Method 8260B. The samples were analyzed on 05/28/2012 and 05/29/2012.

Samples N-05 (680-79660-7)[5X] and Dup 1 (680-79660-8)[5X] required dilution prior to analysis. The reporting limits have been adjusted accordingly.

No difficulties were encountered during the volatiles analyses.

All quality control parameters were within the acceptance limits.

DISSOLVED METALS (ICP)

Samples N-15S (680-79660-4), N-15D (680-79660-5), N-07 (680-79660-6), N-05 (680-79660-7) and Dup 1 (680-79660-8) were analyzed for dissolved metals (ICP) in accordance with EPA SW-846 Method 6010B. The samples were prepared on 05/24/2012 and analyzed on 05/25/2012.

No difficulties were encountered during the metals analyses.

All quality control parameters were within the acceptance limits.

TOTAL SUSPENDED SOLIDS

Samples N-06DR (680-79660-1), N-10 (680-79660-2), N-12 (680-79660-3), N-15S (680-79660-4), N-15D (680-79660-5), N-07 (680-79660-6), N-05 (680-79660-7) and Dup 1 (680-79660-8) were analyzed for total suspended solids in accordance with SM 2540D. The samples were analyzed on 05/21/2012.

No difficulties were encountered during the TSS analyses.

Job ID: 680-79660-1 (Continued)

Laboratory: TestAmerica Savannah (Continued)

All quality control parameters were within the acceptance limits.

ANIONS BY IC

Samples N-15S (680-79660-4), N-15D (680-79660-5), N-07 (680-79660-6), N-05 (680-79660-7) and Dup 1 (680-79660-8) were analyzed for Anions by IC in accordance with EPA Method 300.0. The samples were analyzed on 05/21/2012.

The matrix spike (MS) recovery for batch 238102 was outside control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria.

No other difficulties were encountered during the Anions analyses.

All other quality control parameters were within the acceptance limits.

NITRATE-NITRITE AS NITROGEN

Samples N-15S (680-79660-4), N-15D (680-79660-5), N-07 (680-79660-6), N-05 (680-79660-7) and Dup 1 (680-79660-8) were analyzed for nitrate-nitrite as nitrogen in accordance with EPA Method 353.2. The samples were analyzed on 05/19/2012.

The matrix spike / matrix spike duplicate (MS/MSD) recoveries for batch 238079 were outside control limits. The associated laboratory control sample (LCS) recovery met acceptance criteria.

The opening and closing continuing calibration verification (CCV) standard for nitrate exceeded the percent difference criterion. No corrective action was taken other than to qualify the result since nitrate is determined by difference and the components used to calculate nitrate, nitrate + nitrite and nitrite, were within the method CCV criterion.

No other difficulties were encountered during the nitrate-nitrite analyses.

All other quality control parameters were within the acceptance limits.

Sample Summary

Client: Ashland Inc.
Project/Site: Brunswick 009 Landfill - AQ 5-18-12

TestAmerica Job ID: 680-79660-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
680-79660-1	N-06DR	Water	05/18/12 08:20	05/19/12 10:44
680-79660-2	N-10	Water	05/18/12 09:05	05/19/12 10:44
680-79660-3	N-12	Water	05/18/12 09:55	05/19/12 10:44
680-79660-4	N-15S	Water	05/18/12 11:15	05/19/12 10:44
680-79660-5	N-15D	Water	05/18/12 12:00	05/19/12 10:44
680-79660-6	N-07	Water	05/18/12 13:10	05/19/12 10:44
680-79660-7	N-05	Water	05/18/12 13:55	05/19/12 10:44
680-79660-8	Dup 1	Water	05/18/12 00:00	05/19/12 10:44
680-79660-9	Equipment Blank (EB1)	Water	05/18/12 09:30	05/19/12 10:44
680-79660-10	Equipment Blank (EB2)	Water	05/18/12 09:20	05/19/12 10:44
680-79660-11	Trip Blank	Water	05/18/12 00:00	05/19/12 10:44

Method Summary

Client: Ashland Inc.
Project/Site: Brunswick 009 Landfill - AQ 5-18-12

TestAmerica Job ID: 680-79660-1

Method	Method Description	Protocol	Laboratory
8260B	Volatile Organic Compounds (GC/MS)	SW846	TAL SAV
6010B	Metals (ICP)	SW846	TAL SAV
300.0	Anions, Ion Chromatography	MCAWW	TAL SAV
353.2	Nitrogen, Nitrate-Nitrite	MCAWW	TAL SAV
SM 2540D	Solids, Total Suspended (TSS)	SM	TAL SAV

Protocol References:

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater",

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL SAV = TestAmerica Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Metals

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

General Chemistry

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA, DLCK or MRL standard: Instrument related QC exceeds the control limits.
F	MS or MSD exceeds the control limits

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client: Ashland Inc.
Project/Site: Brunswick 009 Landfill - AQ 5-18-12

TestAmerica Job ID: 680-79660-1

Client Sample ID: N-06DR

Lab Sample ID: 680-79660-1

Date Collected: 05/18/12 08:20
Matrix: Water
Date Received: 05/19/12 10:44

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	1.0	U	1.0	0.25	ug/L			05/28/12 22:11	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*98*		*70 - 130*		*05/28/12 22:11*	*1*
Dibromofluoromethane	*94*		*70 - 130*		*05/28/12 22:11*	*1*
Toluene-d8 (Surr)	*101*		*70 - 130*		*05/28/12 22:11*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	5.0	U	5.0	5.0	mg/L			05/21/12 11:47	1

Client Sample ID: N-10

Lab Sample ID: 680-79660-2

Date Collected: 05/18/12 09:05
Matrix: Water
Date Received: 05/19/12 10:44

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	1.0	U	1.0	0.25	ug/L			05/28/12 22:40	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*98*		*70 - 130*		*05/28/12 22:40*	*1*
Dibromofluoromethane	*96*		*70 - 130*		*05/28/12 22:40*	*1*
Toluene-d8 (Surr)	*102*		*70 - 130*		*05/28/12 22:40*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	5.0	U	5.0	5.0	mg/L			05/21/12 11:51	1

Client Sample ID: N-12

Lab Sample ID: 680-79660-3

Date Collected: 05/18/12 09:55
Matrix: Water
Date Received: 05/19/12 10:44

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	**0.32**	**J**	1.0	0.25	ug/L			05/28/12 22:55	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*99*		*70 - 130*		*05/28/12 22:55*	*1*
Dibromofluoromethane	*95*		*70 - 130*		*05/28/12 22:55*	*1*
Toluene-d8 (Surr)	*101*		*70 - 130*		*05/28/12 22:55*	*1*

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	**10**		5.0	5.0	mg/L			05/21/12 11:53	1

Client Sample ID: N-15S

Lab Sample ID: 680-79660-4

Date Collected: 05/18/12 11:15
Matrix: Water
Date Received: 05/19/12 10:44

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	1.0	U	1.0	0.25	ug/L			05/28/12 23:39	1

Client Sample ID: N-15S

Lab Sample ID: 680-79660-4

Date Collected: 05/18/12 11:15

Matrix: Water

Date Received: 05/19/12 10:44

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene	99		70 - 130		05/28/12 23:39	1
Dibromofluoromethane	98		70 - 130		05/28/12 23:39	1
Toluene-d8 (Surr)	101		70 - 130		05/28/12 23:39	1

Method: 6010B - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dissolved Iron	0.079		0.050	0.024	mg/L		05/24/12 12:41	05/25/12 17:34	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	5.7		5.0	2.6	mg/L			05/21/12 20:58	5
Nitrate as N	0.050	U ^	0.050	0.010	mg/L			05/19/12 18:50	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	5.0	U	5.0	5.0	mg/L			05/21/12 11:55	1

Client Sample ID: N-15D

Lab Sample ID: 680-79660-5

Date Collected: 05/18/12 12:00

Matrix: Water

Date Received: 05/19/12 10:44

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	1.0	U	1.0	0.25	ug/L			05/28/12 23:10	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene	101		70 - 130		05/28/12 23:10	1
Dibromofluoromethane	97		70 - 130		05/28/12 23:10	1
Toluene-d8 (Surr)	103		70 - 130		05/28/12 23:10	1

Method: 6010B - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dissolved Iron	1.4		0.050	0.024	mg/L		05/24/12 12:41	05/25/12 17:39	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	14		5.0	2.6	mg/L			05/21/12 21:11	5
Nitrate as N	0.050	U ^	0.050	0.010	mg/L			05/19/12 18:53	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	5.0	U	5.0	5.0	mg/L			05/21/12 11:59	1

Client Sample ID: N-07

Lab Sample ID: 680-79660-6

Date Collected: 05/18/12 13:10

Matrix: Water

Date Received: 05/19/12 10:44

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.49	J	1.0	0.25	ug/L			05/29/12 13:02	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene	101		70 - 130		05/29/12 13:02	1
Dibromofluoromethane	100		70 - 130		05/29/12 13:02	1
Toluene-d8 (Surr)	100		70 - 130		05/29/12 13:02	1

Client Sample ID: N-07

Lab Sample ID: 680-79660-6

Date Collected: 05/18/12 13:10
Matrix: Water
Date Received: 05/19/12 10:44

Method: 6010B - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dissolved Iron	31		0.050	0.024	mg/L		05/24/12 12:41	05/25/12 17:43	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	17		5.0	2.6	mg/L			05/21/12 21:48	5
Nitrate as N	0.050	U ^	0.050	0.010	mg/L			05/19/12 18:54	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	5.0	U	5.0	5.0	mg/L			05/21/12 11:59	1

Client Sample ID: N-05

Lab Sample ID: 680-79660-7

Date Collected: 05/18/12 13:55
Matrix: Water
Date Received: 05/19/12 10:44

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	710		5.0	1.3	ug/L			05/29/12 12:34	5

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*104*		*70 - 130*		*05/29/12 12:34*	*5*
Dibromofluoromethane	*93*		*70 - 130*		*05/29/12 12:34*	*5*
Toluene-d8 (Surr)	*103*		*70 - 130*		*05/29/12 12:34*	*5*

Method: 6010B - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dissolved Iron	1.8		0.050	0.024	mg/L		05/24/12 12:41	05/25/12 17:47	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	5.0	U	5.0	2.6	mg/L			05/21/12 22:13	5
Nitrate as N	0.050	U ^	0.050	0.010	mg/L			05/19/12 18:56	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	5.0	U	5.0	5.0	mg/L			05/21/12 12:02	1

Client Sample ID: Dup 1

Lab Sample ID: 680-79660-8

Date Collected: 05/18/12 00:00
Matrix: Water
Date Received: 05/19/12 10:44

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	600		5.0	1.3	ug/L			05/29/12 13:58	5

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*101*		*70 - 130*		*05/29/12 13:58*	*5*
Dibromofluoromethane	*95*		*70 - 130*		*05/29/12 13:58*	*5*
Toluene-d8 (Surr)	*100*		*70 - 130*		*05/29/12 13:58*	*5*

Method: 6010B - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dissolved Iron	1.8		0.050	0.024	mg/L		05/24/12 12:41	05/25/12 17:52	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	5.0	U	5.0	2.6	mg/L			05/21/12 22:25	5

Client: Ashland Inc.
Project/Site: Brunswick 009 Landfill - AQ 5-18-12

TestAmerica Job ID: 680-79660-1

Client Sample ID: Dup 1

Lab Sample ID: 680-79660-8

Date Collected: 05/18/12 00:00
Matrix: Water
Date Received: 05/19/12 10:44

General Chemistry (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	0.050	U ^	0.050	0.010	mg/L			05/19/12 18:57	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	5.0		5.0	5.0	mg/L			05/21/12 12:09	1

Client Sample ID: Equipment Blank (EB1)

Lab Sample ID: 680-79660-9

Date Collected: 05/18/12 09:30
Matrix: Water
Date Received: 05/19/12 10:44

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	1.0	U	1.0	0.25	ug/L			05/28/12 20:43	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*98*		*70 - 130*		*05/28/12 20:43*	*1*
Dibromofluoromethane	*94*		*70 - 130*		*05/28/12 20:43*	*1*
Toluene-d8 (Surr)	*102*		*70 - 130*		*05/28/12 20:43*	*1*

Client Sample ID: Equipment Blank (EB2)

Lab Sample ID: 680-79660-10

Date Collected: 05/18/12 09:20
Matrix: Water
Date Received: 05/19/12 10:44

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	1.0	U	1.0	0.25	ug/L			05/28/12 21:12	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*98*		*70 - 130*		*05/28/12 21:12*	*1*
Dibromofluoromethane	*95*		*70 - 130*		*05/28/12 21:12*	*1*
Toluene-d8 (Surr)	*103*		*70 - 130*		*05/28/12 21:12*	*1*

Client Sample ID: Trip Blank

Lab Sample ID: 680-79660-11

Date Collected: 05/18/12 00:00
Matrix: Water
Date Received: 05/19/12 10:44

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	1.0	U	1.0	0.25	ug/L			05/28/12 21:42	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*98*		*70 - 130*		*05/28/12 21:42*	*1*
Dibromofluoromethane	*97*		*70 - 130*		*05/28/12 21:42*	*1*
Toluene-d8 (Surr)	*100*		*70 - 130*		*05/28/12 21:42*	*1*

Surrogate Summary

Client: Ashland Inc.
Project/Site: Brunswick 009 Landfill - AQ 5-18-12

TestAmerica Job ID: 680-79660-1

Method: 8260B - Volatile Organic Compounds (GC/MS)

Matrix: Water

Prep Type: Total/NA

		Percent Surrogate Recovery (Acceptance Limits)		
		BFB	DBFM	TOL
Lab Sample ID	Client Sample ID	(70-130)	(70-130)	(70-130)
680-79660-1	N-06DR	98	94	101
680-79660-2	N-10	98	96	102
680-79660-3	N-12	99	95	101
680-79660-4	N-15S	99	98	101
680-79660-5	N-15D	101	97	103
680-79660-6	N-07	101	100	100
680-79660-7	N-05	104	93	103
680-79660-8	Dup 1	101	95	100
680-79660-9	Equipment Blank (EB1)	98	94	102
680-79660-10	Equipment Blank (EB2)	98	95	103
680-79660-11	Trip Blank	98	97	100
LCS 680-238617/3	Lab Control Sample	108	104	104
LCS 680-238618/3	Lab Control Sample	99	96	98
LCS 680-238686/3	Lab Control Sample	103	101	102
LCSD 680-238617/4	Lab Control Sample Dup	105	101	102
LCSD 680-238618/4	Lab Control Sample Dup	102	99	101
LCSD 680-238686/4	Lab Control Sample Dup	102	103	102
MB 680-238617/6	Method Blank	99	98	102
MB 680-238618/6	Method Blank	98	92	99
MB 680-238686/5	Method Blank	98	96	100

Surrogate Legend

BFB = 4-Bromofluorobenzene

DBFM = Dibromofluoromethane

TOL = Toluene-d8 (Surr)

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 680-238617/6
Matrix: Water
Analysis Batch: 238617

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	1.0	U	1.0	0.25	ug/L			05/28/12 14:41	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*99*		*70 - 130*		*05/28/12 14:41*	*1*
Dibromofluoromethane	*98*		*70 - 130*		*05/28/12 14:41*	*1*
Toluene-d8 (Surr)	*102*		*70 - 130*		*05/28/12 14:41*	*1*

Lab Sample ID: LCS 680-238617/3
Matrix: Water
Analysis Batch: 238617

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Benzene			50.0	47.7		ug/L		95	70 - 130		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene	*108*		*70 - 130*
Dibromofluoromethane	*104*		*70 - 130*
Toluene-d8 (Surr)	*104*		*70 - 130*

Lab Sample ID: LCSD 680-238617/4
Matrix: Water
Analysis Batch: 238617

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene			50.0	46.2		ug/L		92	70 - 130	3	30

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene	*105*		*70 - 130*
Dibromofluoromethane	*101*		*70 - 130*
Toluene-d8 (Surr)	*102*		*70 - 130*

Lab Sample ID: MB 680-238618/6
Matrix: Water
Analysis Batch: 238618

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	1.0	U	1.0	0.25	ug/L			05/28/12 14:56	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*98*		*70 - 130*		*05/28/12 14:56*	*1*
Dibromofluoromethane	*92*		*70 - 130*		*05/28/12 14:56*	*1*
Toluene-d8 (Surr)	*99*		*70 - 130*		*05/28/12 14:56*	*1*

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 680-238618/3
Matrix: Water
Analysis Batch: 238618

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Benzene			50.0	45.3		ug/L		91	70 - 130		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene	*99*		*70 - 130*
Dibromofluoromethane	*96*		*70 - 130*
Toluene-d8 (Surr)	*98*		*70 - 130*

Lab Sample ID: LCSD 680-238618/4
Matrix: Water
Analysis Batch: 238618

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene			50.0	47.9		ug/L		96	70 - 130	6	30

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene	*102*		*70 - 130*
Dibromofluoromethane	*99*		*70 - 130*
Toluene-d8 (Surr)	*101*		*70 - 130*

Lab Sample ID: MB 680-238686/5
Matrix: Water
Analysis Batch: 238686

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	1.0	U	1.0	0.25	ug/L			05/29/12 11:54	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene	*98*		*70 - 130*		*05/29/12 11:54*	*1*
Dibromofluoromethane	*96*		*70 - 130*		*05/29/12 11:54*	*1*
Toluene-d8 (Surr)	*100*		*70 - 130*		*05/29/12 11:54*	*1*

Lab Sample ID: LCS 680-238686/3
Matrix: Water
Analysis Batch: 238686

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Benzene			50.0	46.7		ug/L		93	70 - 130		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene	*103*		*70 - 130*
Dibromofluoromethane	*101*		*70 - 130*
Toluene-d8 (Surr)	*102*		*70 - 130*

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 680-238686/4
Matrix: Water
Analysis Batch: 238686

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene			50.0	47.3		ug/L		95	70 - 130	1	30

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene	*102*		*70 - 130*
Dibromofluoromethane	*103*		*70 - 130*
Toluene-d8 (Surr)	*102*		*70 - 130*

Method: 6010B - Metals (ICP)

Lab Sample ID: MB 680-238389/1-B
Matrix: Water
Analysis Batch: 238551

Client Sample ID: Method Blank
Prep Type: Dissolved
Prep Batch: 238391

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dissolved Iron	0.050	U	0.050	0.024	mg/L		05/24/12 12:41	05/25/12 23:26	1

Lab Sample ID: LCS 680-238389/2-B
Matrix: Water
Analysis Batch: 238551

Client Sample ID: Lab Control Sample
Prep Type: Dissolved
Prep Batch: 238391

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Dissolved Iron			1.00	0.833		mg/L		83	75 - 125		

Lab Sample ID: 680-79660-8 MS
Matrix: Water
Analysis Batch: 238551

Client Sample ID: Dup 1
Prep Type: Dissolved
Prep Batch: 238391

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Dissolved Iron	1.8		1.00	2.88		mg/L		105	75 - 125		

Lab Sample ID: 680-79660-8 MSD
Matrix: Water
Analysis Batch: 238551

Client Sample ID: Dup 1
Prep Type: Dissolved
Prep Batch: 238391

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Dissolved Iron	1.8		1.00	2.91		mg/L		107	75 - 125	1	20

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 680-238102/2
Matrix: Water
Analysis Batch: 238102

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	5.0	U	5.0	2.6	mg/L			05/21/12 18:42	5

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: LCS 680-238102/3
Matrix: Water
Analysis Batch: 238102

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	50.0	54.0		mg/L		108	90 - 110

Lab Sample ID: LCSD 680-238102/4
Matrix: Water
Analysis Batch: 238102

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	50.0	54.0		mg/L		108	90 - 110	0	30

Lab Sample ID: 680-79660-6 MS
Matrix: Water
Analysis Batch: 238102

Client Sample ID: N-07
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	17		50.0	73.6	F	mg/L		113	90 - 110

Method: 353.2 - Nitrogen, Nitrate-Nitrite

Lab Sample ID: MB 680-238079/13
Matrix: Water
Analysis Batch: 238079

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Nitrate as N	0.050	U ^	0.050	0.010	mg/L			05/19/12 18:47	1

Lab Sample ID: LCS 680-238079/14
Matrix: Water
Analysis Batch: 238079

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate Nitrite as N	0.998	1.02		mg/L		102	90 - 110
Nitrite as N	0.502	0.471		mg/L		94	90 - 110

Lab Sample ID: 680-79660-4 MS
Matrix: Water
Analysis Batch: 238079

Client Sample ID: N-15S
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Nitrate Nitrite as N	0.050		0.998	1.12	F	mg/L		112	90 - 110
Nitrite as N	0.050		0.502	0.513		mg/L		102	90 - 110

Lab Sample ID: 680-79660-4 MSD
Matrix: Water
Analysis Batch: 238079

Client Sample ID: N-15S
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Nitrate Nitrite as N	0.050		0.998	1.12	F	mg/L		113	90 - 110	1	10
Nitrite as N	0.050		0.502	0.515		mg/L		103	90 - 110	0	10

Client: Ashland Inc.
Project/Site: Brunswick 009 Landfill - AQ 5-18-12

TestAmerica Job ID: 680-79660-1

Method: SM 2540D - Solids, Total Suspended (TSS)

Lab Sample ID: MB 680-237968/1
Matrix: Water
Analysis Batch: 237968

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Total Suspended Solids	5.0	U	5.0	5.0	mg/L			05/21/12 11:40	1

Lab Sample ID: LCS 680-237968/2
Matrix: Water
Analysis Batch: 237968

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Total Suspended Solids			100	92.5		mg/L		93	80 - 120		

Lab Sample ID: LCSD 680-237968/3
Matrix: Water
Analysis Batch: 237968

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Total Suspended Solids			100	89.0		mg/L		89	80 - 120	4	25

Lab Sample ID: 680-79660-1 DU
Matrix: Water
Analysis Batch: 237968

Client Sample ID: N-06DR
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Total Suspended Solids	5.0	U		5.0	U	mg/L				NC	25

Lab Sample ID: 680-79660-8 DU
Matrix: Water
Analysis Batch: 237968

Client Sample ID: Dup 1
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Total Suspended Solids	5.0			5.00		mg/L				0	25

GC/MS VOA

Analysis Batch: 238617

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-79660-1	N-06DR	Total/NA	Water	8260B	
680-79660-2	N-10	Total/NA	Water	8260B	
680-79660-4	N-15S	Total/NA	Water	8260B	
680-79660-5	N-15D	Total/NA	Water	8260B	
680-79660-9	Equipment Blank (EB1)	Total/NA	Water	8260B	
680-79660-10	Equipment Blank (EB2)	Total/NA	Water	8260B	
680-79660-11	Trip Blank	Total/NA	Water	8260B	
LCS 680-238617/3	Lab Control Sample	Total/NA	Water	8260B	
LCSD 680-238617/4	Lab Control Sample Dup	Total/NA	Water	8260B	
MB 680-238617/6	Method Blank	Total/NA	Water	8260B	

Analysis Batch: 238618

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-79660-3	N-12	Total/NA	Water	8260B	
LCS 680-238618/3	Lab Control Sample	Total/NA	Water	8260B	
LCSD 680-238618/4	Lab Control Sample Dup	Total/NA	Water	8260B	
MB 680-238618/6	Method Blank	Total/NA	Water	8260B	

Analysis Batch: 238686

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-79660-6	N-07	Total/NA	Water	8260B	
680-79660-7	N-05	Total/NA	Water	8260B	
680-79660-8	Dup 1	Total/NA	Water	8260B	
LCS 680-238686/3	Lab Control Sample	Total/NA	Water	8260B	
LCSD 680-238686/4	Lab Control Sample Dup	Total/NA	Water	8260B	
MB 680-238686/5	Method Blank	Total/NA	Water	8260B	

Metals

Prep Batch: 238391

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-79660-4	N-15S	Dissolved	Water	3005A	
680-79660-5	N-15D	Dissolved	Water	3005A	
680-79660-6	N-07	Dissolved	Water	3005A	
680-79660-7	N-05	Dissolved	Water	3005A	
680-79660-8	Dup 1	Dissolved	Water	3005A	
680-79660-8 MS	Dup 1	Dissolved	Water	3005A	
680-79660-8 MSD	Dup 1	Dissolved	Water	3005A	
LCS 680-238389/2-B	Lab Control Sample	Dissolved	Water	3005A	
MB 680-238389/1-B	Method Blank	Dissolved	Water	3005A	

Analysis Batch: 238551

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-79660-4	N-15S	Dissolved	Water	6010B	238391
680-79660-5	N-15D	Dissolved	Water	6010B	238391
680-79660-6	N-07	Dissolved	Water	6010B	238391
680-79660-7	N-05	Dissolved	Water	6010B	238391
680-79660-8	Dup 1	Dissolved	Water	6010B	238391
680-79660-8 MS	Dup 1	Dissolved	Water	6010B	238391
680-79660-8 MSD	Dup 1	Dissolved	Water	6010B	238391
LCS 680-238389/2-B	Lab Control Sample	Dissolved	Water	6010B	238391
MB 680-238389/1-B	Method Blank	Dissolved	Water	6010B	238391

QC Association Summary

Client: Ashland Inc.
Project/Site: Brunswick 009 Landfill - AQ 5-18-12

TestAmerica Job ID: 680-79660-1

General Chemistry

Analysis Batch: 237968

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-79660-1	N-06DR	Total/NA	Water	SM 2540D	
680-79660-1 DU	N-06DR	Total/NA	Water	SM 2540D	
680-79660-2	N-10	Total/NA	Water	SM 2540D	
680-79660-3	N-12	Total/NA	Water	SM 2540D	
680-79660-4	N-15S	Total/NA	Water	SM 2540D	
680-79660-5	N-15D	Total/NA	Water	SM 2540D	
680-79660-6	N-07	Total/NA	Water	SM 2540D	
680-79660-7	N-05	Total/NA	Water	SM 2540D	
680-79660-8	Dup 1	Total/NA	Water	SM 2540D	
680-79660-8 DU	Dup 1	Total/NA	Water	SM 2540D	
LCS 680-237968/2	Lab Control Sample	Total/NA	Water	SM 2540D	
LCSD 680-237968/3	Lab Control Sample Dup	Total/NA	Water	SM 2540D	
MB 680-237968/1	Method Blank	Total/NA	Water	SM 2540D	

Analysis Batch: 238079

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-79660-4	N-15S	Total/NA	Water	353.2	
680-79660-4 MS	N-15S	Total/NA	Water	353.2	
680-79660-4 MSD	N-15S	Total/NA	Water	353.2	
680-79660-5	N-15D	Total/NA	Water	353.2	
680-79660-6	N-07	Total/NA	Water	353.2	
680-79660-7	N-05	Total/NA	Water	353.2	
680-79660-8	Dup 1	Total/NA	Water	353.2	
LCS 680-238079/14	Lab Control Sample	Total/NA	Water	353.2	
MB 680-238079/13	Method Blank	Total/NA	Water	353.2	

Analysis Batch: 238102

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-79660-4	N-15S	Total/NA	Water	300.0	
680-79660-5	N-15D	Total/NA	Water	300.0	
680-79660-6	N-07	Total/NA	Water	300.0	
680-79660-6 MS	N-07	Total/NA	Water	300.0	
680-79660-7	N-05	Total/NA	Water	300.0	
680-79660-8	Dup 1	Total/NA	Water	300.0	
LCS 680-238102/3	Lab Control Sample	Total/NA	Water	300.0	
LCSD 680-238102/4	Lab Control Sample Dup	Total/NA	Water	300.0	
MB 680-238102/2	Method Blank	Total/NA	Water	300.0	

Lab Chronicle

Client: Ashland Inc.
Project/Site: Brunswick 009 Landfill - AQ 5-18-12

TestAmerica Job ID: 680-79660-1

Client Sample ID: N-06DR

Lab Sample ID: 680-79660-1

Date Collected: 05/18/12 08:20
Matrix: Water
Date Received: 05/19/12 10:44

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	238617	05/28/12 22:11	JG	TAL SAV
Total/NA	Analysis	SM 2540D		1	237968	05/21/12 11:47	LE	TAL SAV

Client Sample ID: N-10

Lab Sample ID: 680-79660-2

Date Collected: 05/18/12 09:05
Matrix: Water
Date Received: 05/19/12 10:44

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	238617	05/28/12 22:40	JG	TAL SAV
Total/NA	Analysis	SM 2540D		1	237968	05/21/12 11:51	LE	TAL SAV

Client Sample ID: N-12

Lab Sample ID: 680-79660-3

Date Collected: 05/18/12 09:55
Matrix: Water
Date Received: 05/19/12 10:44

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	238618	05/28/12 22:55	JG	TAL SAV
Total/NA	Analysis	SM 2540D		1	237968	05/21/12 11:53	LE	TAL SAV

Client Sample ID: N-15S

Lab Sample ID: 680-79660-4

Date Collected: 05/18/12 11:15
Matrix: Water
Date Received: 05/19/12 10:44

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	238617	05/28/12 23:39	JG	TAL SAV
Dissolved	Prep	3005A			238391	05/24/12 12:41	CDJ	TAL SAV
Dissolved	Analysis	6010B		1	238551	05/25/12 17:34	BCB	TAL SAV
Total/NA	Analysis	SM 2540D		1	237968	05/21/12 11:55	LE	TAL SAV
Total/NA	Analysis	353.2		1	238079	05/19/12 18:50	JNC	TAL SAV
Total/NA	Analysis	300.0		5	238102	05/21/12 20:58	PAT	TAL SAV

Client Sample ID: N-15D

Lab Sample ID: 680-79660-5

Date Collected: 05/18/12 12:00
Matrix: Water
Date Received: 05/19/12 10:44

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	238617	05/28/12 23:10	JG	TAL SAV
Dissolved	Prep	3005A			238391	05/24/12 12:41	CDJ	TAL SAV
Dissolved	Analysis	6010B		1	238551	05/25/12 17:39	BCB	TAL SAV
Total/NA	Analysis	SM 2540D		1	237968	05/21/12 11:59	LE	TAL SAV
Total/NA	Analysis	353.2		1	238079	05/19/12 18:53	JNC	TAL SAV
Total/NA	Analysis	300.0		5	238102	05/21/12 21:11	PAT	TAL SAV

Lab Chronicle

Client: Ashland Inc.
Project/Site: Brunswick 009 Landfill - AQ 5-18-12

TestAmerica Job ID: 680-79660-1

Client Sample ID: N-07

Lab Sample ID: 680-79660-6

Date Collected: 05/18/12 13:10
Matrix: Water
Date Received: 05/19/12 10:44

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	238686	05/29/12 13:02	JG	TAL SAV
Dissolved	Prep	3005A			238391	05/24/12 12:41	CDJ	TAL SAV
Dissolved	Analysis	6010B		1	238551	05/25/12 17:43	BCB	TAL SAV
Total/NA	Analysis	SM 2540D		1	237968	05/21/12 11:59	LE	TAL SAV
Total/NA	Analysis	353.2		1	238079	05/19/12 18:54	JNC	TAL SAV
Total/NA	Analysis	300.0		5	238102	05/21/12 21:48	PAT	TAL SAV

Client Sample ID: N-05

Lab Sample ID: 680-79660-7

Date Collected: 05/18/12 13:55
Matrix: Water
Date Received: 05/19/12 10:44

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		5	238686	05/29/12 12:34	JG	TAL SAV
Dissolved	Prep	3005A			238391	05/24/12 12:41	CDJ	TAL SAV
Dissolved	Analysis	6010B		1	238551	05/25/12 17:47	BCB	TAL SAV
Total/NA	Analysis	SM 2540D		1	237968	05/21/12 12:02	LE	TAL SAV
Total/NA	Analysis	353.2		1	238079	05/19/12 18:56	JNC	TAL SAV
Total/NA	Analysis	300.0		5	238102	05/21/12 22:13	PAT	TAL SAV

Client Sample ID: Dup 1

Lab Sample ID: 680-79660-8

Date Collected: 05/18/12 00:00
Matrix: Water
Date Received: 05/19/12 10:44

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		5	238686	05/29/12 13:58	JG	TAL SAV
Dissolved	Prep	3005A			238391	05/24/12 12:41	CDJ	TAL SAV
Dissolved	Analysis	6010B		1	238551	05/25/12 17:52	BCB	TAL SAV
Total/NA	Analysis	SM 2540D		1	237968	05/21/12 12:09	LE	TAL SAV
Total/NA	Analysis	353.2		1	238079	05/19/12 18:57	JNC	TAL SAV
Total/NA	Analysis	300.0		5	238102	05/21/12 22:25	PAT	TAL SAV

Client Sample ID: Equipment Blank (EB1)

Lab Sample ID: 680-79660-9

Date Collected: 05/18/12 09:30
Matrix: Water
Date Received: 05/19/12 10:44

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	238617	05/28/12 20:43	JG	TAL SAV

Lab Chronicle

Client: Ashland Inc.
Project/Site: Brunswick 009 Landfill - AQ 5-18-12

TestAmerica Job ID: 680-79660-1

Client Sample ID: Equipment Blank (EB2)

Lab Sample ID: 680-79660-10

Date Collected: 05/18/12 09:20
Matrix: Water
Date Received: 05/19/12 10:44

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	238617	05/28/12 21:12	JG	TAL SAV

Client Sample ID: Trip Blank

Lab Sample ID: 680-79660-11

Date Collected: 05/18/12 00:00
Matrix: Water
Date Received: 05/19/12 10:44

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	238617	05/28/12 21:42	JG	TAL SAV

Laboratory References:

TAL SAV = TestAmerica Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858

Serial Number 53959

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

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Website: www.testamericainc.com
Phone: (912) 354-7858
Fax: (912) 352-0165

◯ Alternate Laboratory Name/Location
Phone:
Fax:

PROJECT REFERENCE	PROJECT NO.	PROJECT LOCATION (STATE)
	WBS 23412L 1	GA
TAL (LAB) PROJECT MANAGER	P.O. NUMBER	CONTRACT NO.
CLIENT (SITE) PM: Gary Rickett	CLIENT PHONE: 704-543-3910	CLIENT FAX
CLIENT NAME: Antea Group	CLIENT E-MAIL	
CLIENT ADDRESS: 8008 Corporate Center Dr. Charlotte, NC 28226		
COMPANY CONTRACTING THIS WORK (if applicable)		

PAGE 1 OF 1

STANDARD REPORT DELIVERY ◯
DATE DUE _____
EXPEDITED REPORT DELIVERY (SURCHARGE) ◯
DATE DUE _____

NUMBER OF COOLERS SUBMITTED PER SHIPMENT:

SAMPLE DATE	SAMPLE TIME	SAMPLE IDENTIFICATION	MATRIX: COMPOSITE (C) OR GRAB (G) INDICATE	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID (OIL, SOLVENT, ...)	REQUIRED ANALYSIS: 8260-Benzene Only	353.2-Nitrate	2340D-TSS	Sulfate	353.2-Nitrate	Gold B - Dissolved Iron					NUMBER OF CONTAINERS SUBMITTED									REMARKS
								HCl	Nitric Acid	PRESERVATIVE																	
5-18-12	0820	N-06DR	G	X				3		1								3		1							
	0905	N-10						3		1								3		1							
	0955	N-12						3		1								3		1							
	1115	N-15S						3	1	1	1	1	1					3	1	1	1	1	1				
	1200	N-15D						3	1	1	1	1	1					3	1	1	1	1	1				
	1310	N-07						3	1	1	1	1	1					3	1	1	1	1	1				
	1355	N-05						3	1	1	1	1	1					3	1	1	1	1	1				
	—	Dup 1						3	1	1	1	1	1					3	1	1	1	1	1				
	0930	Equipment Blank (EB 1)						3										3									
5-18-12	0920	" " (EB 2)	G	X				3										3									
		Trip Blank						4										4									

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
Mandy Muller	5-18-12	1820						
RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME

LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	SAVANNAH LOG NO.	LABORATORY REMARKS
Ruth A Daughtry	5/19/12	1044	YES ◯ NO ◯		680-79660	Temp 0.6°C, 1.4°C

TAL 8240-680 (1008)

Login Sample Receipt Checklist

Client: Ashland Inc.

Job Number: 680-79660-1

Login Number: 79660

List Source: TestAmerica Savannah

List Number: 1

Creator: Daughtry, Beth

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	N/A	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	0.6, 1.4 C
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	Insufficient volume received for MS/MSD.
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	N/A	
Residual Chlorine Checked.	N/A	

Certification Summary

Client: Ashland Inc.
Project/Site: Brunswick 009 Landfill - AQ 5-18-12

TestAmerica Job ID: 680-79660-1

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Savannah	A2LA	DoD ELAP		0399-01
TestAmerica Savannah	A2LA	ISO/IEC 17025		399.01
TestAmerica Savannah	Alabama	State Program	4	41450
TestAmerica Savannah	Arkansas	State Program	6	N/A
TestAmerica Savannah	Arkansas DEQ	State Program	6	88-0692
TestAmerica Savannah	California	NELAC	9	3217CA
TestAmerica Savannah	Colorado	State Program	8	N/A
TestAmerica Savannah	Connecticut	State Program	1	PH-0161
TestAmerica Savannah	Florida	NELAC	4	E87052
TestAmerica Savannah	GA Dept. of Agriculture	State Program	4	N/A
TestAmerica Savannah	Georgia	State Program	4	803
TestAmerica Savannah	Georgia	State Program	4	N/A
TestAmerica Savannah	Guam	State Program	9	09-005r
TestAmerica Savannah	Hawaii	State Program	9	N/A
TestAmerica Savannah	Illinois	NELAC	5	200022
TestAmerica Savannah	Indiana	State Program	5	N/A
TestAmerica Savannah	Iowa	State Program	7	353
TestAmerica Savannah	Kentucky	State Program	4	90084
TestAmerica Savannah	Kentucky (UST)	State Program	4	18
TestAmerica Savannah	Louisiana	NELAC	6	30690
TestAmerica Savannah	Louisiana	NELAC	6	LA100015
TestAmerica Savannah	Maine	State Program	1	GA00006
TestAmerica Savannah	Maryland	State Program	3	250
TestAmerica Savannah	Massachusetts	State Program	1	M-GA006
TestAmerica Savannah	Michigan	State Program	5	9925
TestAmerica Savannah	Mississippi	State Program	4	N/A
TestAmerica Savannah	Montana	State Program	8	CERT0081
TestAmerica Savannah	Nebraska	State Program	7	TestAmerica-Savannah
TestAmerica Savannah	New Jersey	NELAC	2	GA769
TestAmerica Savannah	New Mexico	State Program	6	N/A
TestAmerica Savannah	New York	NELAC	2	10842
TestAmerica Savannah	North Carolina DENR	State Program	4	269
TestAmerica Savannah	North Carolina DHHS	State Program	4	13701
TestAmerica Savannah	Oklahoma	State Program	6	9984
TestAmerica Savannah	Pennsylvania	NELAC	3	68-00474
TestAmerica Savannah	Puerto Rico	State Program	2	GA00006
TestAmerica Savannah	Rhode Island	State Program	1	LAO00244
TestAmerica Savannah	South Carolina	State Program	4	98001
TestAmerica Savannah	Tennessee	State Program	4	TN02961
TestAmerica Savannah	Texas	NELAC	6	T104704185-08-TX
TestAmerica Savannah	USDA	Federal		SAV 3-04
TestAmerica Savannah	Vermont	State Program	1	87052
TestAmerica Savannah	Virginia	NELAC	3	460161
TestAmerica Savannah	Washington	State Program	10	C1794
TestAmerica Savannah	West Virginia	State Program	3	9950C
TestAmerica Savannah	West Virginia DEP	State Program	3	94
TestAmerica Savannah	Wisconsin	State Program	5	999819810
TestAmerica Savannah	Wyoming	State Program	8	8TMS-Q

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.

Pace Analytical Services, Inc.
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

June 06, 2012

TONY MANCINI
ANTEA GROUP
800 DUTCH SQUARE BLVD.
BLDG. B, SUITE 111
Columbia, SC 29210

RE: Project: WBS2341261.0003 HERCULES 009
Pace Project No.: 4060575

Dear TONY MANCINI:
Enclosed are the analytical results for sample(s) received by the laboratory on May 19, 2012. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Tod Noltemeyer

Tod Noltemeyer

tod.noltemeyer@pacelabs.com
Project Manager

Enclosures

cc: TIM HASSETT, HERCULES, INC

Pace Analytical Services, Inc.
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CERTIFICATIONS

Project: WBS2341261.0003 HERCULES 009
Pace Project No.: 4060575

Green Bay Certification IDs

1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 11888
North Carolina Certification #: 503
North Dakota Certification #: R-150
South Carolina Certification #: 83006001
US Dept of Agriculture #: S-76505
Wisconsin Certification #: 405132750

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SAMPLE SUMMARY

Project: WBS2341261.0003 HERCULES 009
Pace Project No.: 4060575

Lab ID	Sample ID	Matrix	Date Collected	Date Received
4060575001	N-06DR	Water	05/18/12 08:20	05/19/12 09:45
4060575002	N-10	Water	05/18/12 09:05	05/19/12 09:45
4060575003	N-12	Water	05/18/12 09:55	05/19/12 09:45
4060575004	N-15S	Water	05/18/12 11:15	05/19/12 09:45
4060575005	N-15D	Water	05/18/12 12:00	05/19/12 09:45
4060575006	N-07	Water	05/18/12 13:10	05/19/12 09:45
4060575007	N-05	Water	05/18/12 13:55	05/19/12 09:45
4060575008	DUP 1	Water	05/18/12 00:00	05/19/12 09:45

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SAMPLE ANALYTE COUNT

Project: WBS2341261.0003 HERCULES 009
Pace Project No.: 4060575

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
4060575001	**N-06DR**	EPA 8081	KHB	1	PASI-G
		EPA 8081	KHB	3	PASI-G
4060575002	**N-10**	EPA 8081	KHB	1	PASI-G
		EPA 8081	KHB	3	PASI-G
4060575003	**N-12**	EPA 8081	KHB	1	PASI-G
		EPA 8081	KHB	3	PASI-G
4060575004	**N-15S**	EPA 8081	KHB	1	PASI-G
		EPA 8081	KHB	3	PASI-G
4060575005	**N-15D**	EPA 8081	KHB	1	PASI-G
		EPA 8081	KHB	3	PASI-G
4060575006	**N-07**	EPA 8081	KHB	1	PASI-G
		EPA 8081	KHB	3	PASI-G
4060575007	**N-05**	EPA 8081	KHB	1	PASI-G
		EPA 8081	KHB	3	PASI-G
4060575008	**DUP 1**	EPA 8081	KHB	1	PASI-G
		EPA 8081	KHB	3	PASI-G

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PROJECT NARRATIVE

Project: WBS2341261.0003 HERCULES 009
Pace Project No.: 4060575

Method: **EPA 8081**
Description: 8081 Toxaphene, Total Area
Client: HERCULES, INC
Date: June 06, 2012

General Information:
8 samples were analyzed for EPA 8081. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3510 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: GCSV/7688

A matrix spike/matrix spike duplicate was not performed due to insufficient sample volume.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

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PROJECT NARRATIVE

Project: WBS2341261.0003 HERCULES 009
Pace Project No.: 4060575

Method: **EPA 8081**
Description: 8081 GCS Toxaphene
Client: HERCULES, INC
Date: June 06, 2012

General Information:
8 samples were analyzed for EPA 8081. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3510 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: GCSV/7687

A matrix spike/matrix spike duplicate was not performed due to insufficient sample volume.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

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ANALYTICAL RESULTS

Project: WBS2341261.0003 HERCULES 009
Pace Project No.: 4060575

Sample: N-06DR **Lab ID: 4060575001** Collected: 05/18/12 08:20 Received: 05/19/12 09:45 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8081 Toxaphene, Total Area	Analytical Method: EPA 8081 Preparation Method: EPA 3510								
Chlorinated Camphenes	**<0.49**	ug/L	3.0	0.49	1	05/24/12 12:00	05/31/12 23:59	8001-35-2	JN
8081 GCS Toxaphene	Analytical Method: EPA 8081 Preparation Method: EPA 3510								
Toxaphene	**<0.49**	ug/L	3.0	0.49	1	05/24/12 12:00	05/31/12 23:59	8001-35-2	
Surrogates									
Tetrachloro-m-xylene (S)	81	%.	31-130		1	05/24/12 12:00	05/31/12 23:59	877-09-8	
Decachlorobiphenyl (S)	86	%.	26-130		1	05/24/12 12:00	05/31/12 23:59	2051-24-3	

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ANALYTICAL RESULTS

Project: WBS2341261.0003 HERCULES 009
Pace Project No.: 4060575

Sample: N-10 **Lab ID: 4060575002** Collected: 05/18/12 09:05 Received: 05/19/12 09:45 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8081 Toxaphene, Total Area	Analytical Method: EPA 8081 Preparation Method: EPA 3510								
Chlorinated Camphenes	**<0.47**	ug/L	2.9	0.47	1	05/24/12 12:00	06/01/12 00:20	8001-35-2	JN
8081 GCS Toxaphene	Analytical Method: EPA 8081 Preparation Method: EPA 3510								
Toxaphene	**<0.47**	ug/L	2.9	0.47	1	05/24/12 12:00	06/01/12 00:20	8001-35-2	
Surrogates									
Tetrachloro-m-xylene (S)	78	%.	31-130		1	05/24/12 12:00	06/01/12 00:20	877-09-8	
Decachlorobiphenyl (S)	69	%.	26-130		1	05/24/12 12:00	06/01/12 00:20	2051-24-3	

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ANALYTICAL RESULTS

Project: WBS2341261.0003 HERCULES 009
Pace Project No.: 4060575

Sample: N-12 **Lab ID: 4060575003** Collected: 05/18/12 09:55 Received: 05/19/12 09:45 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8081 Toxaphene, Total Area	Analytical Method: EPA 8081 Preparation Method: EPA 3510								
Chlorinated Camphenes	**<0.48**	ug/L	2.9	0.48	1	05/24/12 12:00	06/01/12 00:42	8001-35-2	JN
8081 GCS Toxaphene	Analytical Method: EPA 8081 Preparation Method: EPA 3510								
Toxaphene	**<0.48**	ug/L	2.9	0.48	1	05/24/12 12:00	06/01/12 00:42	8001-35-2	
Surrogates									
Tetrachloro-m-xylene (S)	78	%.	31-130		1	05/24/12 12:00	06/01/12 00:42	877-09-8	
Decachlorobiphenyl (S)	59	%.	26-130		1	05/24/12 12:00	06/01/12 00:42	2051-24-3	

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ANALYTICAL RESULTS

Project: WBS2341261.0003 HERCULES 009
Pace Project No.: 4060575

Sample: N-15S **Lab ID: 4060575004** Collected: 05/18/12 11:15 Received: 05/19/12 09:45 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8081 Toxaphene, Total Area	Analytical Method: EPA 8081 Preparation Method: EPA 3510								
Chlorinated Camphenes	**<0.49**	ug/L	3.0	0.49	1	05/24/12 12:00	06/01/12 01:03	8001-35-2	JN
8081 GCS Toxaphene	Analytical Method: EPA 8081 Preparation Method: EPA 3510								
Toxaphene	**<0.49**	ug/L	3.0	0.49	1	05/24/12 12:00	06/01/12 01:03	8001-35-2	
Surrogates									
Tetrachloro-m-xylene (S)	79	%.	31-130		1	05/24/12 12:00	06/01/12 01:03	877-09-8	
Decachlorobiphenyl (S)	69	%.	26-130		1	05/24/12 12:00	06/01/12 01:03	2051-24-3	

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ANALYTICAL RESULTS

Project: WBS2341261.0003 HERCULES 009
Pace Project No.: 4060575

Sample: N-15D **Lab ID: 4060575005** Collected: 05/18/12 12:00 Received: 05/19/12 09:45 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8081 Toxaphene, Total Area	Analytical Method: EPA 8081 Preparation Method: EPA 3510								
Chlorinated Camphenes	**<0.46**	ug/L	2.8	0.46	1	05/24/12 12:00	06/01/12 01:24	8001-35-2	JN
8081 GCS Toxaphene	Analytical Method: EPA 8081 Preparation Method: EPA 3510								
Toxaphene	**<0.46**	ug/L	2.8	0.46	1	05/24/12 12:00	06/01/12 01:24	8001-35-2	
Surrogates									
Tetrachloro-m-xylene (S)	81	%.	31-130		1	05/24/12 12:00	06/01/12 01:24	877-09-8	
Decachlorobiphenyl (S)	76	%.	26-130		1	05/24/12 12:00	06/01/12 01:24	2051-24-3	

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ANALYTICAL RESULTS

Project: WBS2341261.0003 HERCULES 009
Pace Project No.: 4060575

Sample: N-07 **Lab ID: 4060575006** Collected: 05/18/12 13:10 Received: 05/19/12 09:45 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8081 Toxaphene, Total Area	Analytical Method: EPA 8081 Preparation Method: EPA 3510								
Chlorinated Camphenes	**<0.48**	ug/L	2.9	0.48	1	05/24/12 12:00	06/01/12 01:45	8001-35-2	JN
8081 GCS Toxaphene	Analytical Method: EPA 8081 Preparation Method: EPA 3510								
Toxaphene	**<0.48**	ug/L	2.9	0.48	1	05/24/12 12:00	06/01/12 01:45	8001-35-2	
Surrogates									
Tetrachloro-m-xylene (S)	93	%.	31-130		1	05/24/12 12:00	06/01/12 01:45	877-09-8	
Decachlorobiphenyl (S)	96	%.	26-130		1	05/24/12 12:00	06/01/12 01:45	2051-24-3	

Pace Analytical Services, Inc.
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Green Bay, WI 54302
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ANALYTICAL RESULTS

Project: WBS2341261.0003 HERCULES 009
Pace Project No.: 4060575

Sample: N-05 **Lab ID: 4060575007** Collected: 05/18/12 13:55 Received: 05/19/12 09:45 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8081 Toxaphene, Total Area	Analytical Method: EPA 8081 Preparation Method: EPA 3510								
Chlorinated Camphenes	**<0.48**	ug/L	2.9	0.48	1	05/24/12 12:00	06/01/12 02:07	8001-35-2	JN
8081 GCS Toxaphene	Analytical Method: EPA 8081 Preparation Method: EPA 3510								
Toxaphene	**<0.48**	ug/L	2.9	0.48	1	05/24/12 12:00	06/01/12 02:07	8001-35-2	
Surrogates									
Tetrachloro-m-xylene (S)	81	%.	31-130		1	05/24/12 12:00	06/01/12 02:07	877-09-8	
Decachlorobiphenyl (S)	91	%.	26-130		1	05/24/12 12:00	06/01/12 02:07	2051-24-3	

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ANALYTICAL RESULTS

Project: WBS2341261.0003 HERCULES 009
Pace Project No.: 4060575

Sample: DUP 1 **Lab ID: 4060575008** Collected: 05/18/12 00:00 Received: 05/19/12 09:45 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8081 Toxaphene, Total Area	Analytical Method: EPA 8081 Preparation Method: EPA 3510								
Chlorinated Camphenes	**<0.48**	ug/L	2.9	0.48	1	05/24/12 12:00	06/01/12 02:28	8001-35-2	JN
8081 GCS Toxaphene	Analytical Method: EPA 8081 Preparation Method: EPA 3510								
Toxaphene	**<0.48**	ug/L	2.9	0.48	1	05/24/12 12:00	06/01/12 02:28	8001-35-2	
Surrogates									
Tetrachloro-m-xylene (S)	92	%.	31-130		1	05/24/12 12:00	06/01/12 02:28	877-09-8	
Decachlorobiphenyl (S)	89	%.	26-130		1	05/24/12 12:00	06/01/12 02:28	2051-24-3	

Pace Analytical Services, Inc.
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QUALITY CONTROL DATA

Project: WBS2341261.0003 HERCULES 009
Pace Project No.: 4060575

QC Batch: OEXT/14611 Analysis Method: EPA 8081
QC Batch Method: EPA 3510 Analysis Description: 8081 Toxaphene, Total Area Under Curve
Associated Lab Samples: 4060575001, 4060575002, 4060575003, 4060575004, 4060575005, 4060575006, 4060575007, 4060575008

METHOD BLANK: 610775 Matrix: Water
Associated Lab Samples: 4060575001, 4060575002, 4060575003, 4060575004, 4060575005, 4060575006, 4060575007, 4060575008

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chlorinated Camphenes	ug/L	<0.49	3.0	05/31/12 22:55	JN

LABORATORY CONTROL SAMPLE & LCSD: 610776 610777

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
Chlorinated Camphenes	ug/L	40	39.0	39.8	98	99	70-130	2	20	JN

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, Inc.
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALITY CONTROL DATA

Project: WBS2341261.0003 HERCULES 009
Pace Project No.: 4060575

QC Batch: OEXT/14610 Analysis Method: EPA 8081
QC Batch Method: EPA 3510 Analysis Description: 8081 GCS Toxaphene
Associated Lab Samples: 4060575001, 4060575002, 4060575003, 4060575004, 4060575005, 4060575006, 4060575007, 4060575008

METHOD BLANK: 610768 Matrix: Water
Associated Lab Samples: 4060575001, 4060575002, 4060575003, 4060575004, 4060575005, 4060575006, 4060575007, 4060575008

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Toxaphene	ug/L	<0.49	3.0	05/31/12 22:55	
Decachlorobiphenyl (S)	%.	71	26-130	05/31/12 22:55	
Tetrachloro-m-xylene (S)	%.	66	31-130	05/31/12 22:55	

LABORATORY CONTROL SAMPLE & LCSD: 610769 610770

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
Toxaphene	ug/L	40	43.9	46.2	110	116	70-130	5	20	
Decachlorobiphenyl (S)	%.				88	79	26-130			
Tetrachloro-m-xylene (S)	%.				68	81	31-130			

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QUALIFIERS

Project: WBS2341261.0003 HERCULES 009
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DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-G	Pace Analytical Services - Green Bay

BATCH QUALIFIERS

Batch: GCSV/7687

[M5]	A matrix spike/matrix spike duplicate was not performed for this batch due to insufficient sample volume.

Batch: GCSV/7688

[M5]	A matrix spike/matrix spike duplicate was not performed for this batch due to insufficient sample volume.

ANALYTE QUALIFIERS

JN	Estimated value, due to poor pattern matching or suspected co-elution with other unidentified peaks. All method QC identification criteria were met.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: WBS2341261.0003 HERCULES 009
Pace Project No.: 4060575

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
4060575001	**N-06DR**	EPA 3510	OEXT/14611	EPA 8081	GCSV/7688
4060575002	**N-10**	EPA 3510	OEXT/14611	EPA 8081	GCSV/7688
4060575003	**N-12**	EPA 3510	OEXT/14611	EPA 8081	GCSV/7688
4060575004	**N-15S**	EPA 3510	OEXT/14611	EPA 8081	GCSV/7688
4060575005	**N-15D**	EPA 3510	OEXT/14611	EPA 8081	GCSV/7688
4060575006	**N-07**	EPA 3510	OEXT/14611	EPA 8081	GCSV/7688
4060575007	**N-05**	EPA 3510	OEXT/14611	EPA 8081	GCSV/7688
4060575008	**DUP 1**	EPA 3510	OEXT/14611	EPA 8081	GCSV/7688
4060575001	**N-06DR**	EPA 3510	OEXT/14610	EPA 8081	GCSV/7687
4060575002	**N-10**	EPA 3510	OEXT/14610	EPA 8081	GCSV/7687
4060575003	**N-12**	EPA 3510	OEXT/14610	EPA 8081	GCSV/7687
4060575004	**N-15S**	EPA 3510	OEXT/14610	EPA 8081	GCSV/7687
4060575005	**N-15D**	EPA 3510	OEXT/14610	EPA 8081	GCSV/7687
4060575006	**N-07**	EPA 3510	OEXT/14610	EPA 8081	GCSV/7687
4060575007	**N-05**	EPA 3510	OEXT/14610	EPA 8081	GCSV/7687
4060575008	**DUP 1**	EPA 3510	OEXT/14610	EPA 8081	GCSV/7687

Pace Analytical®
www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

706070

KF

Page: 1 of 1

1585835

Section A Required Client Information:	Section B Required Project Information:	Section C Invoice Information:
Company: Antea Group	Report To: Gary Ribblett	Attention: Gary Ribblett
Address: 9008 Corporate Center Dr Suite 100 Charlotte, NC	Copy To:	Company Name:
		Address:
Email To: gary.ribblett@anteagroup.com	Purchase Order No.:	Pace Quote Reference:
Phone: 704-543-3910 Fax:	Project Name: Hercules 004 Landfill	Pace Project Manager:
Requested Due Date/TAT:	Project Number: WBS 23412L1.0003	Pace Profile #:

REGULATORY AGENCY

NPDES [X] GROUND WATER [ ] DRINKING WATER
UST [ ] RCRA [ ] OTHER _____

Site Location STATE: GA

Requested Analysis Filtered (Y/N)

ITEM #	Section D Required Client Information — SAMPLE ID (A-Z, 0-9 / , -) Sample IDs MUST BE UNIQUE	Matrix Codes (MATRIX / CODE)	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED: COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Y/N	Analysis Test: 8081-Toxaphene	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	N-06DR	001	WT	G	5/18/12		5-18-12	0820	21	2	X	X		X						X	N	2-1Lag A
2	N-10	002						0905														
3	N-12	003						0955														
4	N-15S	004						1115														
5	N-15D	005						1200														
6	N-07	006						1310														
7	N05	007	WT	G			5/18/12	1355	21	2	X	X								X	N	
8	~~Trip Blank~~									4				X						X		
9	Dup 1 X	008					5/18/12															
10																						
11																						
12	X Added to COC by lab. 5/19/12																					

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
	Marty Mullis / Antea	5-18-12	1800				
	FedEx	5/19/12	945	Pace	5/19/12	945	4° Y Y Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Marty Mullis

SIGNATURE of SAMPLER: Marty Mullis DATE Signed (MM/DD/YY): 5-18-12

Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
4°	Y	Y	Y

ORIGINAL

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

Pace Analytical Services, Inc.
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Pace Analytical

Sample Condition Upon Receipt

Client Name: Antea Group Project # 4060575

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other _____

Tracking #: _____

Custody Seal on Cooler/Box Present: ☑ yes ☐ no Seals intact: ☑ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☐ None Other

Optional
Proj. Due Date:
Proj. Name:

Thermometer Used JB **Type of Ice:** (Wet) Blue Dry None ☑ Samples on ice, cooling process has begun.

Cooler Temperature 4 **Biological Tissue is Frozen:** ☐ yes ☐ no

Temp Blank Present: ☐ yes ☑ no

Temp should be above freezing to 6°C for all sample except Biota.
Biota Samples should be received ≤ 0°C.

Person examining contents:
Date: 5/19/12
Initials: KE

		Comments:
Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes ☑No ☐N/A	6.
Rush Turn Around Time Requested:	☐Yes ☑No ☐N/A	7.
Sufficient Volume: 5/19/12	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☑Yes ☐No ☐N/A	
Containers Intact:	☐Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☐N/A	11.
Sample Labels match COC:	☐Yes ☑No ☐N/A	12. Preservatives do not match samples received 5/19/12
-Includes date/time/ID/Analysis Matrix: W		
All containers needing preservation have been checked.	☐Yes ☐No ☑N/A	13.
All containers needing preservation are found to be in compliance with EPA recommendation.	☐Yes ☐No ☑N/A	
exceptions: VOA, coliform, TOC, O&G, WI-DRO (water)	☐Yes ☐No	Initial when completed / Lot # of added preservative
Samples checked for dechlorination:	☐Yes ☐No ☑N/A	14.
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	15.
Trip Blank Present:	☐Yes ☐No ☑N/A	16.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: [signature] Date: 5/19/12

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Hercules 009 Landfill
Toxaphene Cogeners Analysis Well/Sample Numbers
Sampled 05/18/2012

Well	Sample No.
N-05	4060575-007
N-07	4060575-006
N-10	4060575-002
N-12	4060575-003
N-06DR	4060575-001
N-15D	4060575-005
N-15S	4060575-004
Duplicate N-05	4060575-008

Hercules Incorporated
Research Center
500 Hercules Road
Wilmington, DE 19808-1599
(302) 995-3000

Date December 11, 2012

cc: J.E. Brady – 8136A/255C
B. L. Carr - 8100/229
J.M. Hoffman - 8139/131

Document File
MS file - 8100/109

TO: T. D. Hassett - EHS - 8139/132

FROM: C. C. Lynch - Analytical & Technology Services – 8100/109

Ground Water Extracts for Toxaphene Congeners by GC/ECNIMS and GC/ECD for 2012

A series of ground water samples collected from monitoring wells, located at the Hercules Incorporated 009 landfill, were extracted using SW8463510C by Pace Analytical Laboratories. The hexane extracts were received at the Research Center in August of 2012 and stored at 0°C. The hexane extracts were analyzed for 8 specific toxaphene congeners as described in the method section below.

Calibration curves ranging from 0.5ng/mL to 5ng/mL were established for ECNIMS and ECD for each of the eight congeners. Based on the lowest calibration standard of 0.5ng/mL and a concentration factor of 100, the method limit of quantitation (LOQ) was 0.005ng/mL. If peaks were detected below the LOQ they were report as ≤0.005ng/mL in Table 1- ECNIMS and Table 2 - ECD. If no peaks were detected, they were reported as <0.005ng/mL. Figures 1 through 4 show the total ion chromatogram (TIC) and ECD chromatogram of a 3ng/mL standard and sample 4060575-001 respectively.

Method

The inlet, inlet liner, and glassware used for this work were deactivated as described in the procedure section of this report. A 100ng/mL solution of mixed congeners was injected first to condition any reactive sites in the instrument. A six point calibration curve, raging from 0.5ng/mL to 5.0ng/mL for each congener, was run before the sample. A midpoint standard was run at the end of the series. The standards used for this work were DE-USL (Parlars' 26, 50, & 62,), DE-TOX 484 (Hx-Sed, Hp-Sed, 2-endo,3-exo,6-exo,8,9,10-HxCB, and 2-exo,3-endo,5-exo,6-exo,8,9,10-HpCB), DE-TOX 453 (P44), DE-TOX 454 (P41), & DE-TOX 445 (P40) purchased from LGC Standards. The solutions were combined and serial dilutions were made for the standards. Burdick & Jackson GC^2 hexane was used for all dilutions. Only the eight relevant congeners were measured.

Instrument: Agilent 6890/5975 inert XL MSD; splitless injection; μ-ECD @ 320°C (make-up Ultra P5 40ml/min. total); MS: negative CI mode (methane @ 40%); microfluidics splitter: 2:1 MSD to ECD, Aux. 3 pressure: 3.8psig; SIM mode. SIM details are available upon request; Flow: 1.5ml/min.; Column: J&W DB-XLBMSD 30m x 0.25mm x 0.25μmdf; Samples and standards were transferred to 2ml autosampler vials with PTFE lined caps. 2μl of each solution was injected into a 4mm recessed gooseneck inlet liner.

LCS and LCSD extracts were diluted 50:1 prior to running.

Vials were be recapped as soon as possible after having been punctured to reduce hexane evaporation.

Calibration

Calibration curves for each of the eight congeners were established before running samples. Appendix 1 shows the calibration data obtained for this work. Included in the charts is the % difference for the mid-point verification standard.

Craig C Lynch

Table 1 - Congeners by ECNIMS in ng/mL

2012 009 Landfill Groundwater Results
Congeners as determined by ECNIMS (ng/mL)

Sample	Hx-Sed	Hp-Sed	Parlar 26	Parlar 41	Parlar 40	Parlar 44	Parlar 50	Parlar 62
4060575-001	0.011	≤0.005	≤0.005	≤0.005	≤0.005	≤0.005	≤0.005	<0.005
4060575-002	0.005	≤0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
4060575-003	≤0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
4060575-004	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
4060575-005	≤0.005	≤0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
4060575-006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
4060575-007	≤0.005	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
4060575-008	≤0.005	≤0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
QA/QC Samples								
610768MB	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
610769LCS	*0.019	*0.132	*0.187	*0.089	*0.359	*0.629	*0.551	*0.654
610770LCSD	*0.023	*0.148	*0.148	*0.079	*0.308	*0.582	*0.500	*0.397

*Peak partially coeluted with other peak/s.
< means below LOQ, no peak was detected
≤ means below LOQ but a peak was measured

Table 2 - Congeners by ECD in ng/mL

2012 009 Landfill Groundwater Results
Congeners as determined by ECD (ng/mL)

Sample	Hx-Sed	Hp-Sed	Parlar 26	Parlar 41	Parlar 40	Parlar 44	Parlar 50	Parlar 62
4060575-001	0.012	*0.007	≤0.005	≤0.005	≤0.005	<0.005	≤0.005	<0.005
4060575-002	0.005	≤0.005	≤0.005	<0.005	≤0.005	<0.005	<0.005	<0.005
4060575-003	≤0.005	≤0.005	<0.005	≤0.005	<0.005	<0.005	<0.005	<0.005
4060575-004	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
4060575-005	≤0.005	≤0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
4060575-006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
4060575-007	≤0.005	0.008	<0.005	≤0.005	≤0.006	≤0.007	≤0.008	<0.005
4060575-008	≤0.005	≤0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
QA/QC Samples								
610768MB	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
610769LCS	*0.037	*0.236	*0.194	*0.065	*0.220	*0.245	*0.466	*0.705
610770LCSD	*0.042	*0.236	*0.248	*0.078	*0.251	*0.235	*0.517	*0.739

*Peak partially coeluted with other peak/s.
< means below LOQ, no peak was detected
≤ means below LOQ but a peak was measured

Procedures

Deactivating glassware and inlet

When dissolved in hexane, toxaphene is known to adhere to glass surfaces which can affect accuracy. This can be a particular problem with low ppb standards. All calibration volumetric flasks, 17ml vials, 24 dram vials, and autosampler vials, along with the metal surfaces and inlet liner for the GC inlet were treated with Sylon CT®.

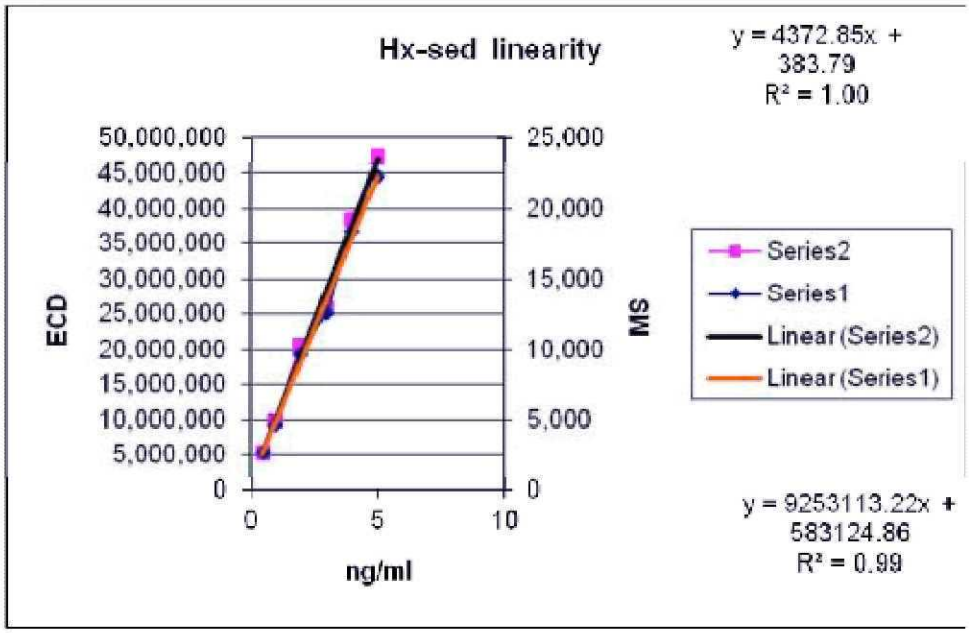
Procedure: Sylon-CT®, Supelco Cat. No. 33065-U, dimethyldichlorosilane in toluene. Coat surfaces with reagent for 10 to 15 seconds. Rinse two times with toluene. Rinse three times with methanol. Dry with either clean nitrogen or in an oven set to 50°C.

Appendix 1 –calibration data

Hx-Sed calibration curve

toxaphene calibration curve Hx-Sed
X34700-40

	Hx-Sed			ECNIMS		ECD	
ng/ml	MS area	ECD area	ng injected	CF	Ave. CF	CF	Ave. CF
0.5	2,614	5,267,537	0.0010	2614000	2328401	5267537000	4851208379
1.0	4,657	9,803,948	0.0020	2328500	SD	4901974000	SD
2.0	9,679	20,501,284	0.0040	2419750	177866	5125321000	340213359
3.0	12,548	25,779,408	0.0060	2091333	RSD	4296568000	RSD
4.0	18,337	38,354,703	0.0080	2292125		4794337875	
5.0	22,247	47,215,124	0.0100	2224700	7.64	4721512400	7.01



CF = area/ng injected
RSD = SD/CF(ave.)x100

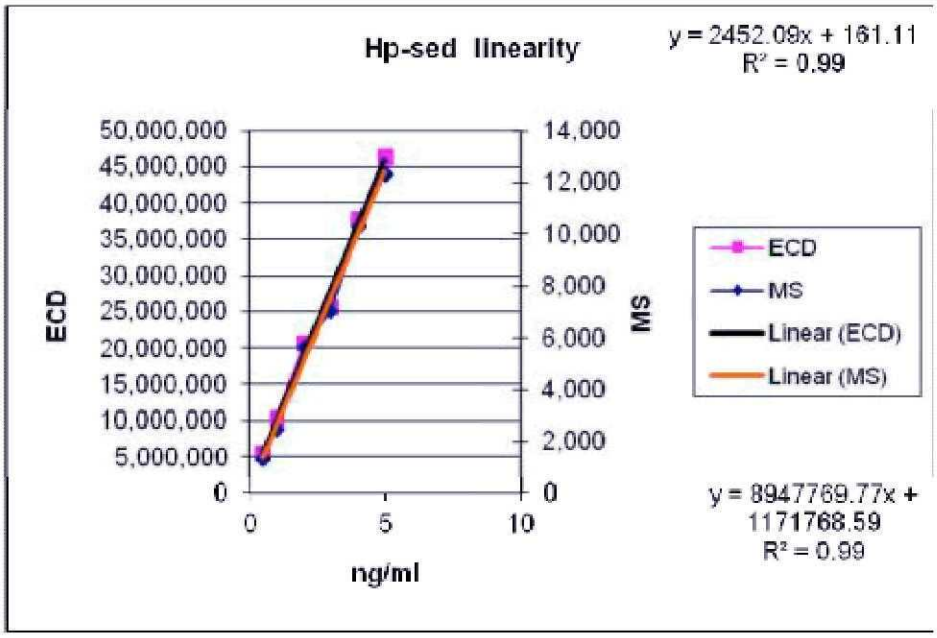
midpoint comparison 3.0ng/ml, Hx-Sed			ng injected 0.0060			
	Area		CF		% difference	
Run #	ECNIMS	ECD	ECNIMS	ECD	ECNIMS	ECD
Ave. CF			2328401	4851208379	initial	initial
19	12,914	28,860,857	2152333.3	4810142833	-7.6	-0.8

%difference = (CF- Ave. CF)/Ave. CF x 100

Hp-Sed calibration curve

toxaphene calibration curve Hp-Sed
X34700-40

	Hp-Sed			ECNIMS		ECD	
ng/ml	MS area	ECD area	ng injected	CF	Ave. CF	CF	Ave.CF
0.5	1,328	5,437,146	0.0010	1328000	1272856	5437146000	4884107651
1.0	2,445	10,258,549	0.0020	1222500	SD	5129274500	SD
2.0	5,615	20,603,416	0.0040	1403750	84016	5150854000	430651010.9
3.0	7,016	25,560,311	0.0060	1169333	RSD	4260051833	RSD
4.0	10,262	37,646,299	0.0080	1282750		4705787375	
5.0	12,308	46,215,322	0.0100	1230800	6.60	4621532200	8.82



CF = area/ng injected
RSD = SD/CF(ave.)x100

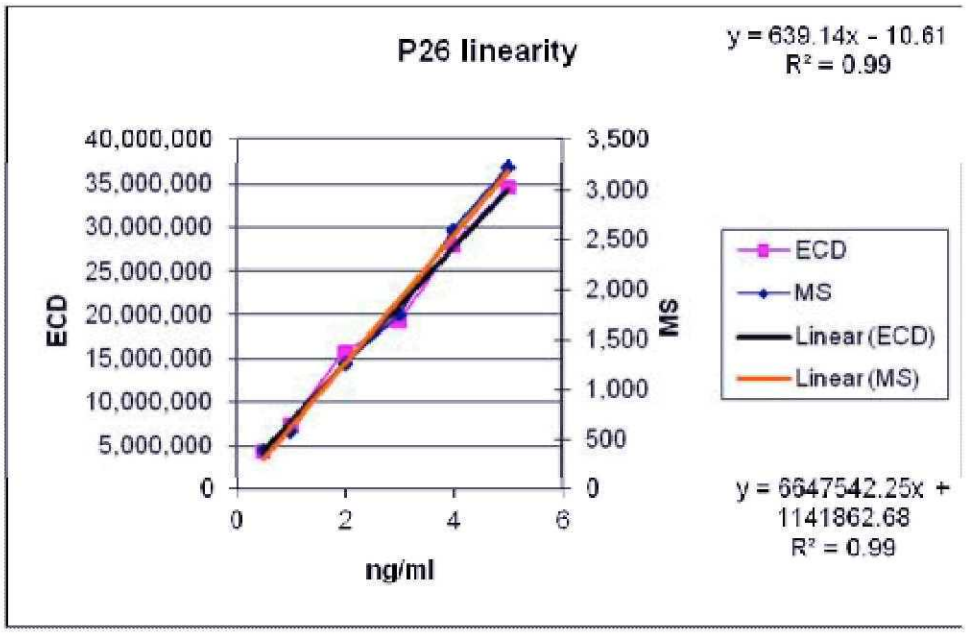
midpoint comparison 3.0ng/ml			ng injected 0.0060			
	Area		CF		% difference	
Run #	ECNIMS	ECD	ECNIMS	ECD	ECNIMS	ECD
Ave. CF			1272856	4884107651	initial	initial
18	7,269	28,622,373	1211500	4770395500	-4.8	-2.3

%difference = (CF- Ave. CF)/Ave. CF x 100

P26 calibration curve

initial toxaphene calibration curve Parlar 26
X34700-40

				ECNIMS		ECD	
ppb	MS area	ECD area	ng injected	CF	Ave. CF	CF	Ave. CF
0.5	398	4,442,550	0.0010	398000	325213	4442550000	3729208500
1.0	593	7,546,262	0.0020	296500	SD	3773131000	SD
2.0	1,263	15,869,193	0.0040	315750	38177	3967298250	434551984
3.0	1,755	19,334,766	0.0060	292500	RSD	3222461000	RSD
4.0	2,605	28,011,190	0.0080	325625		3501398750	
5.0	3,229	34,684,120	0.0100	322900	11.74	3468412000	11.65



CF = area/ng injected
RSD = SD/CF(ave.)x100

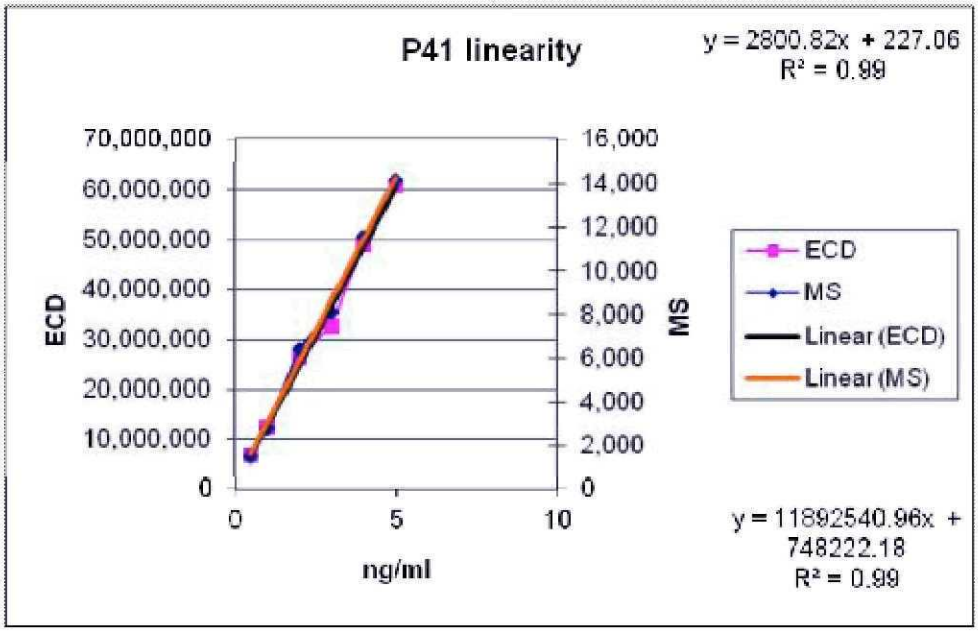
			ng injected			
midpoint comparison 3.0ng/ml			0.0060			
	Area		CF		% difference	
Run #	ECNIMS	ECD	ECNIMS	ECD	ECNIMS	ECD
Ave. CF			325213	3729208500	initial	initial
18	1,942	22,366,932	323666.67	3727822000	-0.5	0.0

%difference = (CF- Ave. CF)/Ave. CF x 100

P41 calibration curve

initial toxaphene calibration curve Parlar 41
X34700-40

				ECNIMS		ECD	
ppb	MS area	ECD area	ng injected	CF	Ave. CF	CF	Ave. CF
0.5	1,555	6,944,914	0.0010	1555000	1468985	6944914000	6252844826
1.0	2,837	12,478,485	0.0020	1418500	SD	6239242500	SD
2.0	6,460	26,513,722	0.0040	1615000	96068	6628430500	504009967
3.0	8,159	32,822,777	0.0060	1359833	RSD	5470462833	RSD
4.0	11,567	49,105,485	0.0080	1445875		6138185625	
5.0	14,197	60,958,335	0.0100	1419700	6.54	6095833500	8.06



RSD = SD/CF(ave.)x100

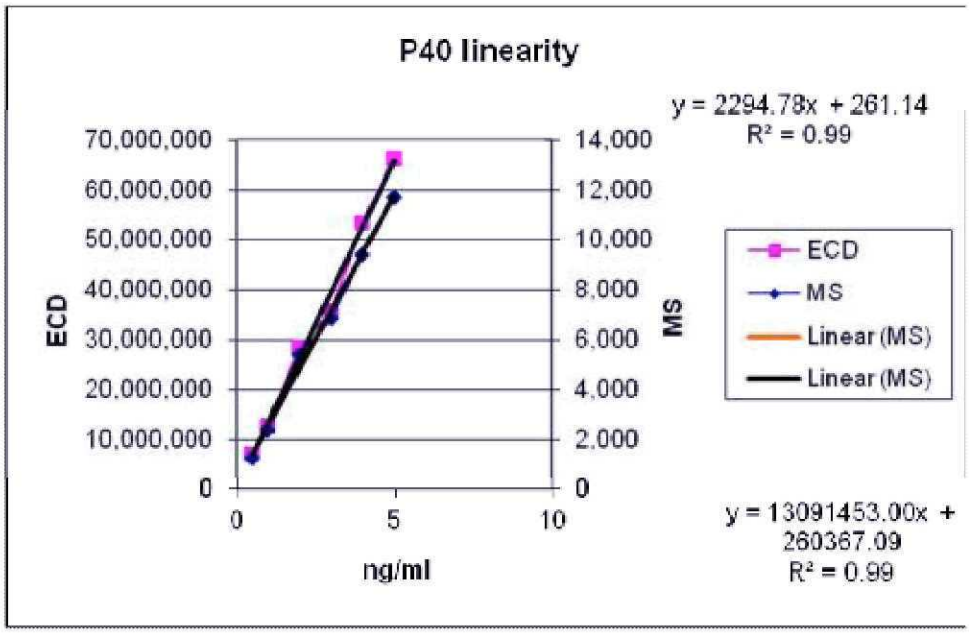
			ng injected			
midpoint comparison 3.0ng/ml			0.0060			
	Area		CF		% difference	
Run #	ECNIMS	ECD	ECNIMS	ECD	ECNIMS	ECD
Ave. CF			1468985	6252844826	initial	initial
11	8,307	36,615,174	1384500	6102529000	-5.8	-2.4

%difference = (CF- Ave. CF)/Ave. CF x 100

P40 calibration curve

initial toxaphene calibration curve Parlar 40
X34700-40

				ECNIMS		ECD	
ppb	MS area	ECD area	ng injected	CF	Ave. CF	CF	Ave. CF
0.5	1,309	7,201,442	0.0010	1309000	1225799	7201442000	6684559219
1.0	2,397	12,886,059	0.0020	1198500	SD	6443029500	SD
2.0	5,412	28,650,853	0.0040	1353000	84614	7162713250	461526017
3.0	6,853	35,826,712	0.0060	1142167	RSD	5971118667	RSD
4.0	9,425	53,503,444	0.0080	1178125		6687930500	
5.0	11,740	66,411,214	0.0100	1174000	6.90	6641121400	6.90



RSD = SD/CF(ave.)x100

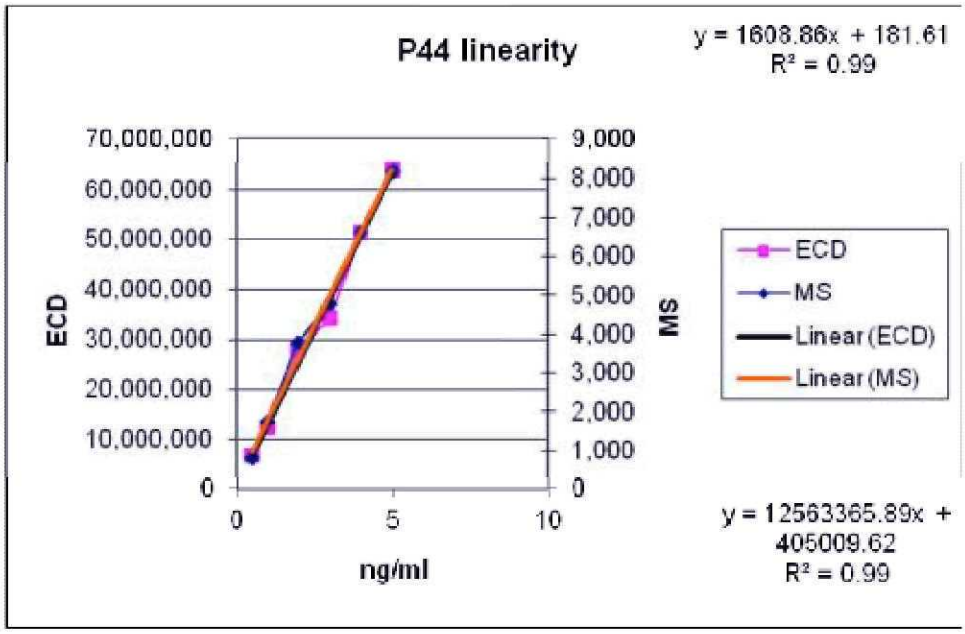
			ng injected			
midpoint comparison 3.0ng/ml			0.0060			
	Area		CF		% difference	
Run #	ECNIMS	ECD	ECNIMS	ECD	ECNIMS	ECD
Ave. CF			1225799	6684559219	initial	initial
19	6,895	39,705,860	1149167	6617643333	-6.3	-1.0

%difference = (CF- Ave. CF)/Ave. CF x 100

P44 calibration curve

initial toxaphene calibration curve Parlar 44
X34700-40

				ECNIMS		ECD	
ppb	MS area	ECD area	ng injected	CF	Ave. CF	CF	Ave. CF
0.5	837	6,998,307	0.0010	837000	852832	6998307000	6462152051
1.0	1,765	12,468,052	0.0020	882500	SD	6234026000	SD
2.0	3,801	27,966,838	0.0040	950250	55196	6991709500	483820370
3.0	4,789	34,344,356	0.0060	798167	RSD	5724059333	RSD
4.0	6,623	51,453,715	0.0080	827875		6431714375	
5.0	8,212	63,930,961	0.0100	821200	6.47	6393096100	7.49



RSD = SD/CF(ave.)x100

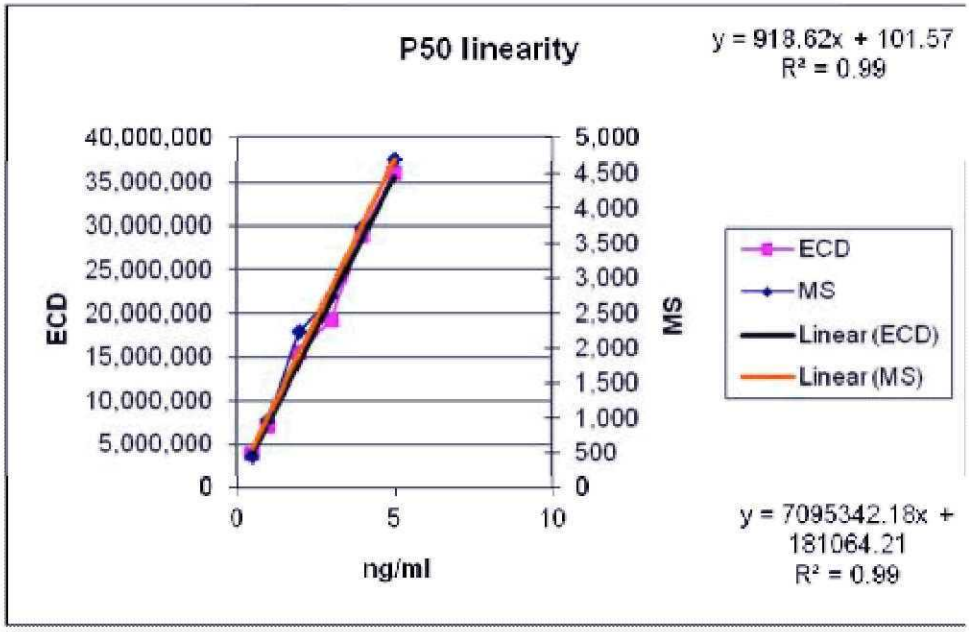
			ng injected			
midpoint comparison 3.0ng/ml			0.0060			
	Area		CF		% difference	
Run #	ECNIMS	ECD	ECNIMS	ECD	ECNIMS	ECD
Ave. CF			852832	6462152051	initial	initial
18	4,895	38,370,652	815833.33	6395108667	-4.3	-1.0

%difference = (CF- Ave. CF)/Ave. CF x 100

P50 calibration curve

initial toxaphene calibration curve Parlar 50
X34700-40

				ECNIMS		ECD	
ppb	MS area	ECD area	ng injected	CF	Ave. CF	CF	Ave. CF
0.5	456	3,923,901	0.0010	456000	483069	3923901000	3639901924
1.0	974	7,147,648	0.0020	487000	SD	3573824000	SD
2.0	2,252	15,518,165	0.0040	563000	40771	3879541250	251729792
3.0	2,737	19,340,638	0.0060	456167	RSD	3223439667	RSD
4.0	3,734	29,012,877	0.0080	466750		3626609625	
5.0	4,695	36,120,960	0.0100	469500	8.44	3612096000	6.92



RSD = SD/CF(ave.)x100

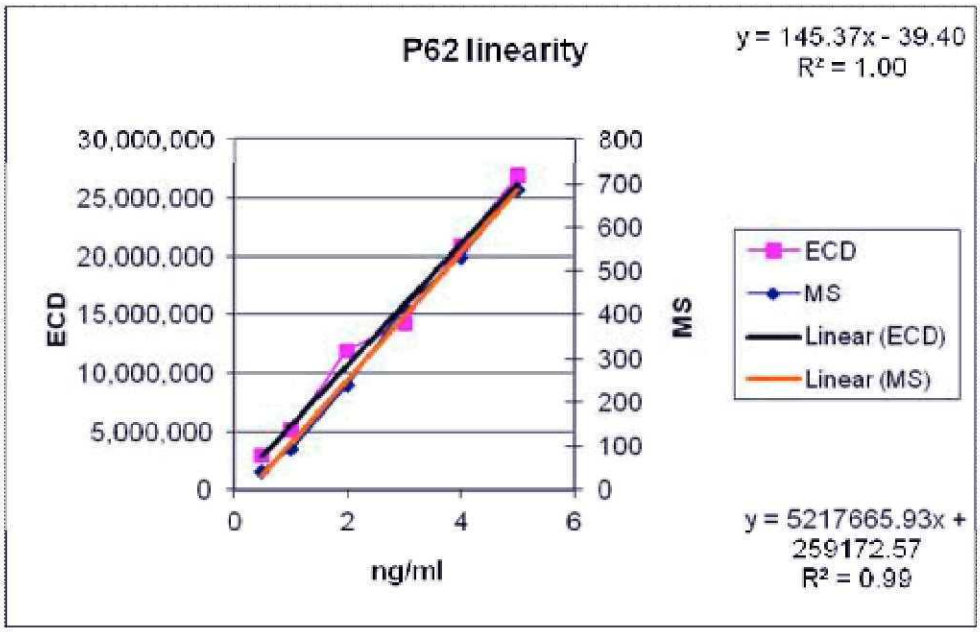
			ng injected			
midpoint comparison 3.0ng/ml			0.0060			
	Area		CF		% difference	
Run #	ECNIMS	ECD	ECNIMS	ECD	ECNIMS	ECD
Ave. CF			483069	3639901924	initial	initial
18	2,704	21,521,784	450666.67	3586964000	-6.7	-1.5

%difference = (CF- Ave. CF)/Ave. CF x 100

P62 calibration curve

initial toxaphene calibration curve Parlar 62
X34700-40

				ECNIMS		ECD	
ng/ml	MS area	ECD area	ng injected	CF	Ave. CF	CF	Ave. CF
0.5	42	2,951,039	0.0010	43750	59258	3073998958	2724627856
1.0	94	5,156,757	0.0020	47000	SD	2578378500	SD
2.0	239	11,982,809	0.0040	59750	11341	2995702250	263173443
3.0	417	14,293,950	0.0060	69500	RSD	2382325000	RSD
4.0	534	20,934,701	0.0080	66750		2616837625	
5.0	688	27,005,248	0.0100	68800	19.14	2700524800	9.66



RSD = SD/CF(ave.)x100

			ng injected			
midpoint comparison 3.0ng/ml			0.0060			
	Area		CF		% difference	
Run #	ECNIMS	ECD	ECNIMS	ECD	ECNIMS	ECD
Ave. CF			59342	2733437578	initial	initial
18	408	15,244,057	68000	2540676167	14.6	-7.1

%difference = (CF- Ave. CF)/Ave. CF x 100

Figure 1 – 3.0ng/ml standard TIC

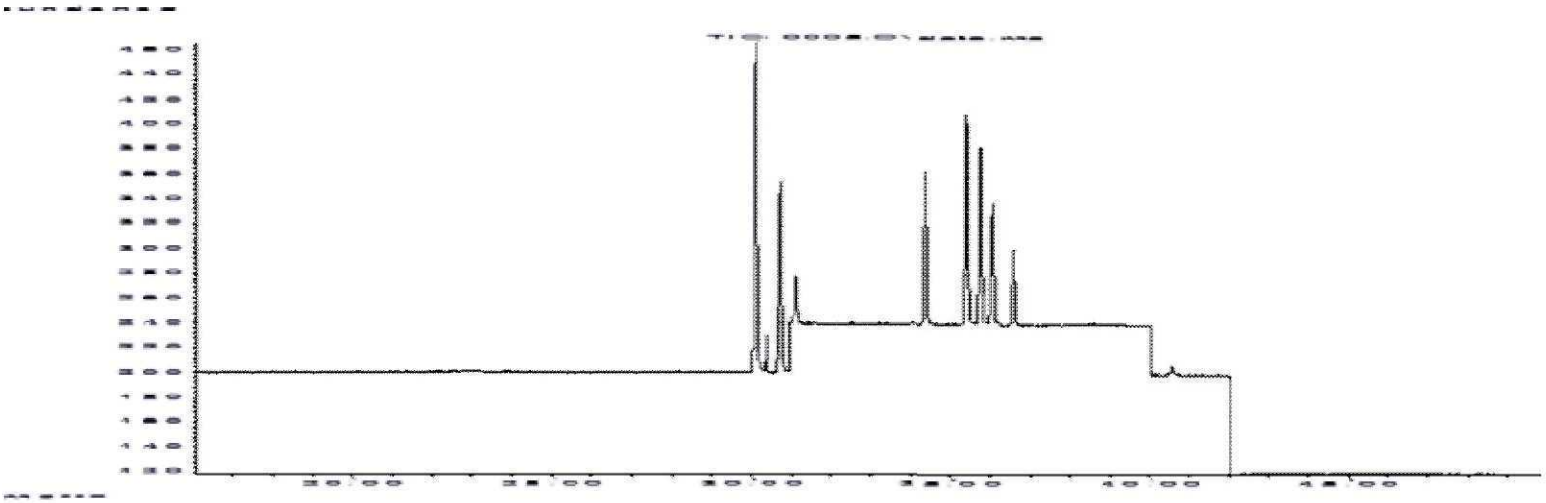


Figure 2 – 3.0ng/ml standard ECD

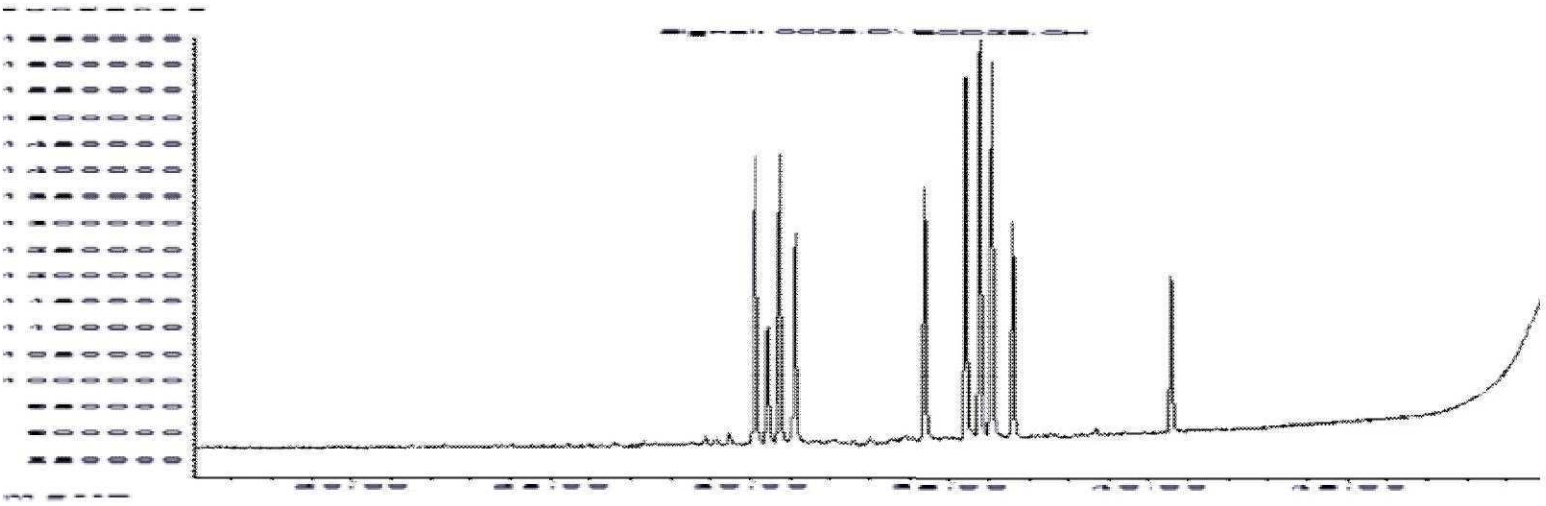


Figure 3 – 4060575-001 TIC

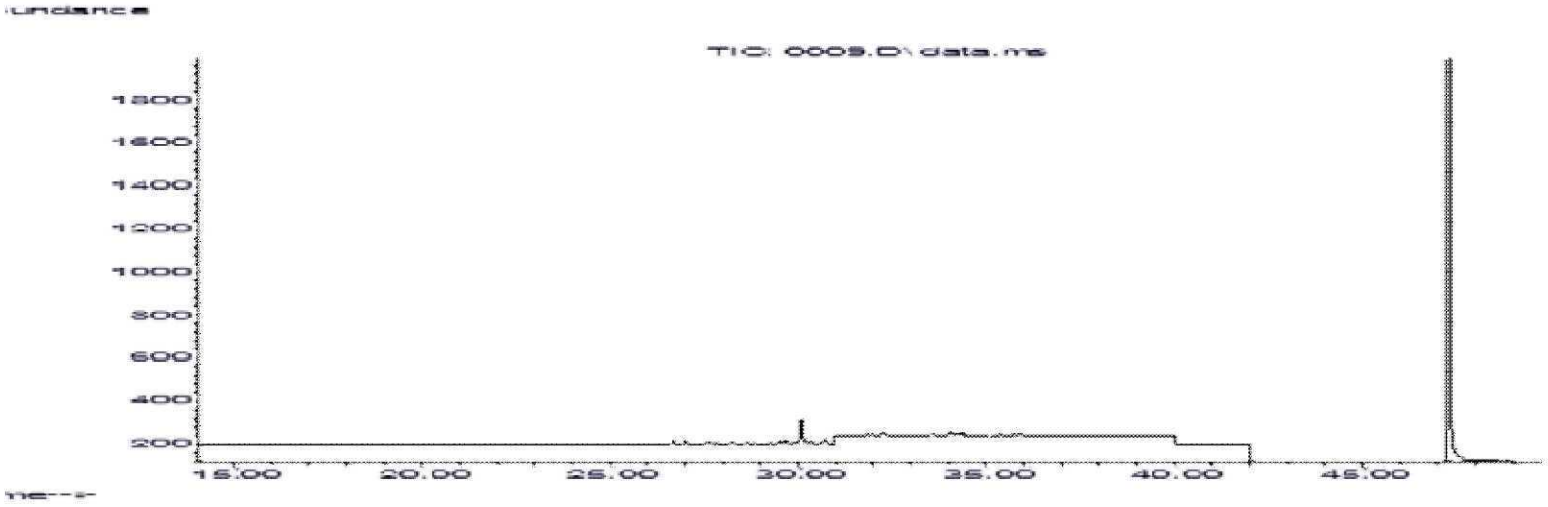
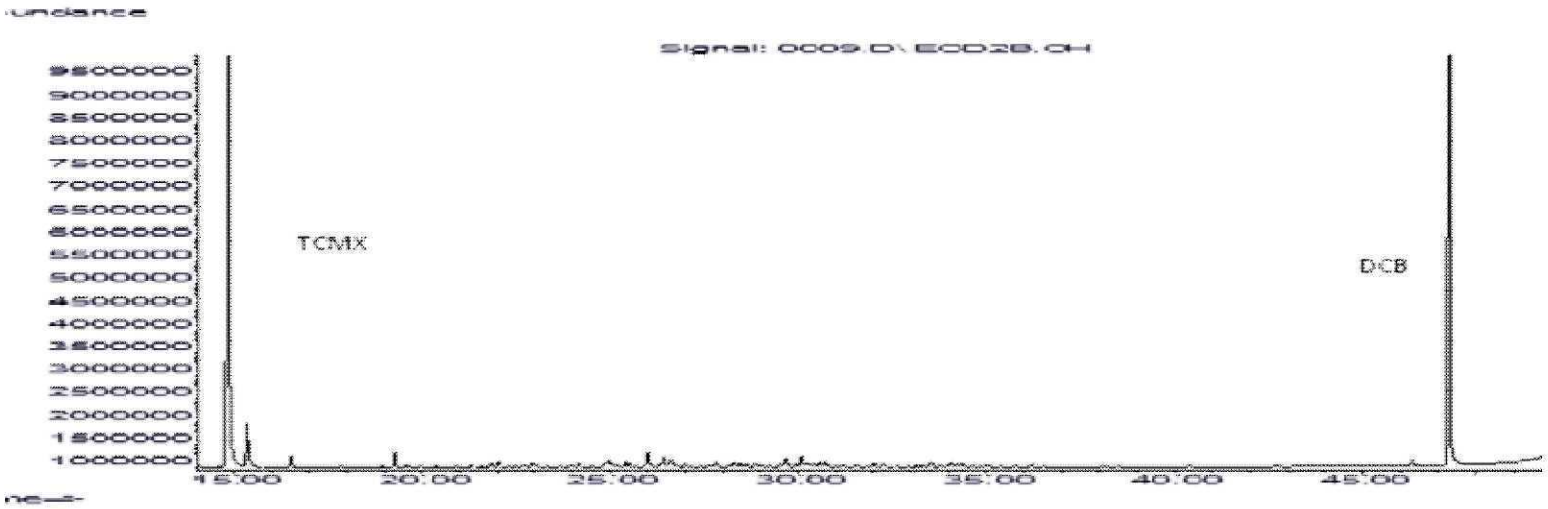


Figure 4 – 4060575-001 ECD



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HERCULES

Date November 12, 2012

cc: J.E. Brady – 8136A/255C
B. L. Carr - 8100/229
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Document File
MS file - 8100/109

TO: T. D. Hassett - EHS - 8139/132

FROM: C. C. Lynch - Analytical & Technology Services – 8100/109

Hercules® Landfill 009 Ground Water Extracts 2012 by GC/ECD
For Total Area Under the Curve

A series of ground water samples were collected from monitoring wells located at the Hercules Incorporated 009 landfill, located in Brunswick GA. The samples were extracted using SW8463510C by Pace Analytical Laboratories and the hexane extracts were received at the Research Center in August 2012. At the Research Center, the hexane extracts were stored at 0°C prior to being analyzed against technical toxaphene (TTX) as described in the method section below.

Results are listed in Table 1. Figure 1 shows the ECD chromatograms for Parlar 11/69 and the 107.80ng/ml TTX standard. Baselines were measured starting at Parlar 11 and ending after Parlar 69. Figure 2 shows the ECD chromatograms for the method blank and sample 4060575-001. After the initial run of all samples, LCS and LCSD extracts were diluted 50:1 with hexane and rerun.

Calibration

A calibration curve ranging from approximately 20ng/mL to 200ng/mL was established for Hercules technical toxaphene X16189-49 prior to running samples. Appendix 1 shows the calibration data obtained for this work. Included in the chart is the % difference for the mid-point verification standards. Based on the lowest calibration standard of 20ng/mL and a concentration

factor of 100, the method limit of quantitation (LOQ) was 0.2ng/mL. Peaks that were detected below the LOQ were report as ≤0.2ng/mL. All calibrations met QA/QC protocols as outlined in EPA method 8276.

Method

The inlet, inlet liner, and glassware used for this work were deactivated as described in the procedure section of this report. A 2000ng/ml solution of Hercules® technical toxaphene was injected first to condition any reactive sites in the instrument. A six point calibration curve, raging from approximately 20ng/ml to 200ng/ml for TTX, was run immediately before the samples. A midpoint standard was run at the end of the series. Burdick & Jackson GC^2 hexane was used for all dilutions.

Instrument: Agilent 6890/5975 inert XL MSD; splitless injection; μ-ECD @ 320°C (make-up Ultra P5 40ml/min. total); microfluidics splitter: 2:1 MSD to ECD, Aux. 3 pressure: 3.8psig; Flow: 1.5ml/min.; Column: J&W DB-XLBMSD 30m x 0.25mm x 0.25μmdf; Samples and standards were transferred to 2ml autosampler vials with PTFE lined caps. 2μl of each solution was injected into a 4mm gooseneck inlet liner.

Procedures

Deactivating glassware and inlet

When dissolved in hexane, toxaphene is known to adhere to glass surfaces which can affect accuracy. This can be a particular problem with low concentration standards and samples. All calibration volumetric flasks, 17ml vials, 24 dram vials, and autosampler vials, along with the metal surfaces and inlet liner for the GC inlet were treated with Sylon CT®.

Procedure: Sylon-CT®, Supelco Cat. No. 33065-U, dimethyldichlorosilane in toluene. Coat surfaces with reagent for 10 to 15 seconds. Rinse two times with toluene. Rinse three times with methanol. Dry with either clean nitrogen or in an oven set to 50°C.

Table 1 ECD results

2012 009 Landfill Groundwater Results

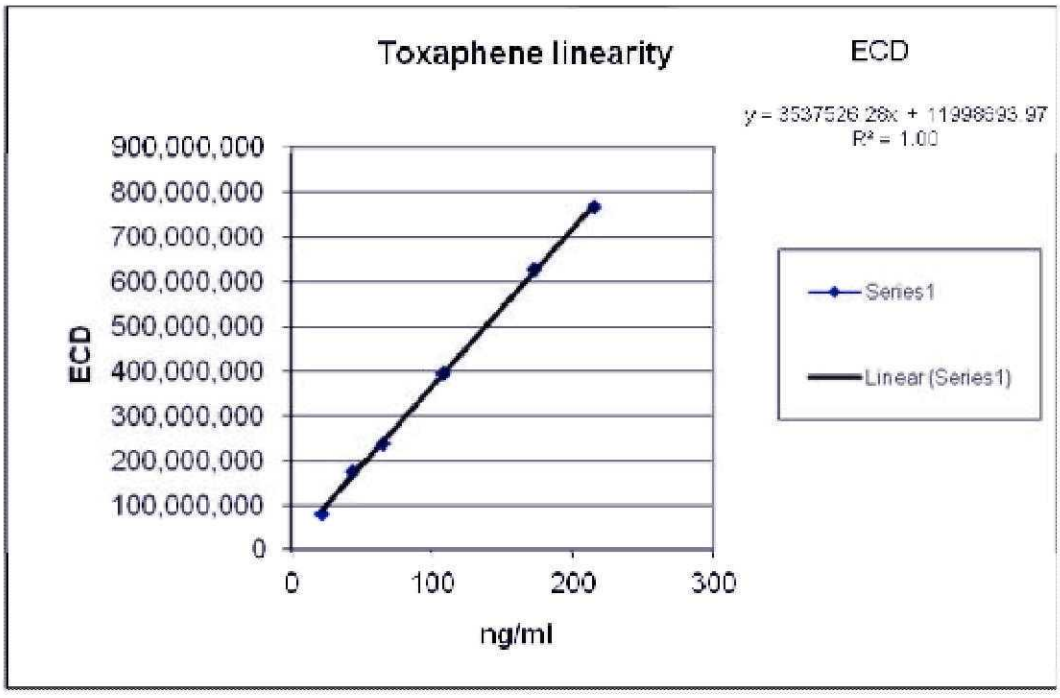
Sample	Maximum TTX **ng/ml**
4060545-001	0.5
4060545-002	0.2
4060545-003	0.5
4060545-004	≤0.2
4060545-005	≤0.2
4060545-006	≤0.2
4060545-007	0.3
4060545-008	0.3
QA/QC Samples	
610768 MB	<0.2
610769 LCS	39.0
610770 LCSD	49.9
Recoveries	%
610769 LCS	97.6
610770 LCSD	124.7

≤means below LOQ but peaks were measured

Appendix 1 – calibration data, ECD TAUC

toxaphene calibration curve Hercules X16189-49
calibration curve, ground water extracts, TTX
X34700-39

ng/ml	ECD area	ng injected	ECD CF	Ave. CF
21.56	80,457,474	0.0431	1,865,896,892	1,858,909,992
43.12	173,747,559	0.0862	2,014,698,040	SD
64.68	237,933,429	0.1294	1,839,312,222	80872498
107.80	394,190,346	0.2156	1,828,341,122	
172.45	628,281,954	0.3449	1,821,635,123	RSD
215.60	769,078,208	0.4312	1,783,576,549	4.35



CF = area/ng injected
RSD = SD/CF(ave.)x100

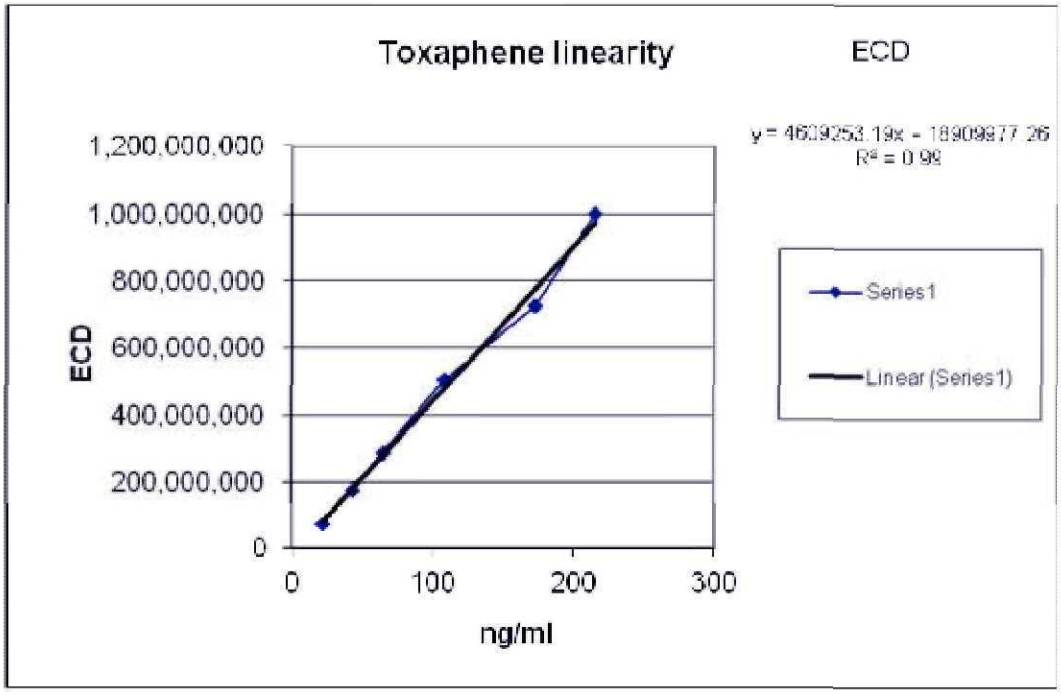
midpoint comparison 100ng/mL			ng injected 0.2156
Run #	Area	CF	% difference ECD
Ave. CF		1,858,909,992	initial
20	445,957,121	2,068,446,758	11.3

%difference = (CF- Ave. CF)/Ave. CF x 100

Second calibration for diluted samples

toxaphene calibration curve Hercules X16189-49
calibration curve, ground water extracts, TTX
X34700-39

ng/ml	ECD area	ng injected	ECD CF	Ave. CF
21.56	74,463,109	0.0431	1,726,881,006	2,125,517,467
43.12	177,095,747	0.0862	2,053,522,113	SD
64.68	285,532,868	0.1294	2,207,273,253	226214619
107.80	504,524,767	0.2156	2,340,096,322	
172.45	725,482,453	0.3449	2,103,457,388	RSD
215.60	1,001,192,379	0.4312	2,321,874,719	10.64

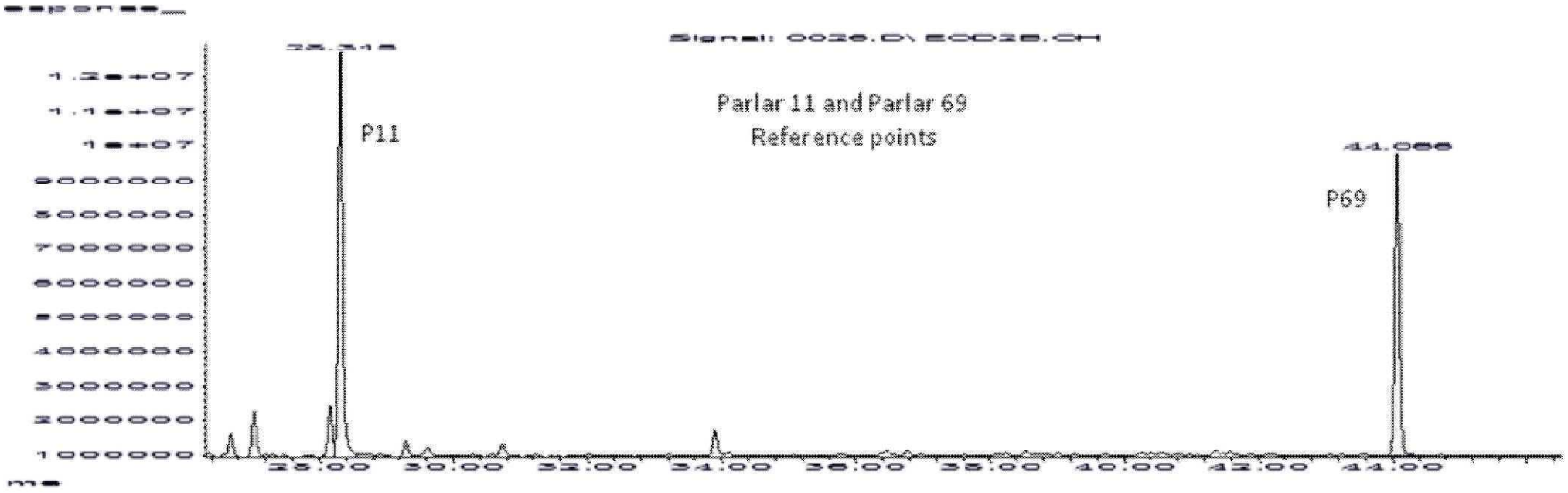


CF = area/ng injected
RSD = SD/CF(ave.)x100

midpoint comparison 107.8ng/mL			ng injected 0.2156
Run #	Area	CF	% difference ECD
Ave. CF		2,125,517,467	initial
10	502,909,843	2,332,605,951	9.7

%difference = (CF- Ave. CF)/Ave. CF x 100

Figure 1 – ECD chromatograms



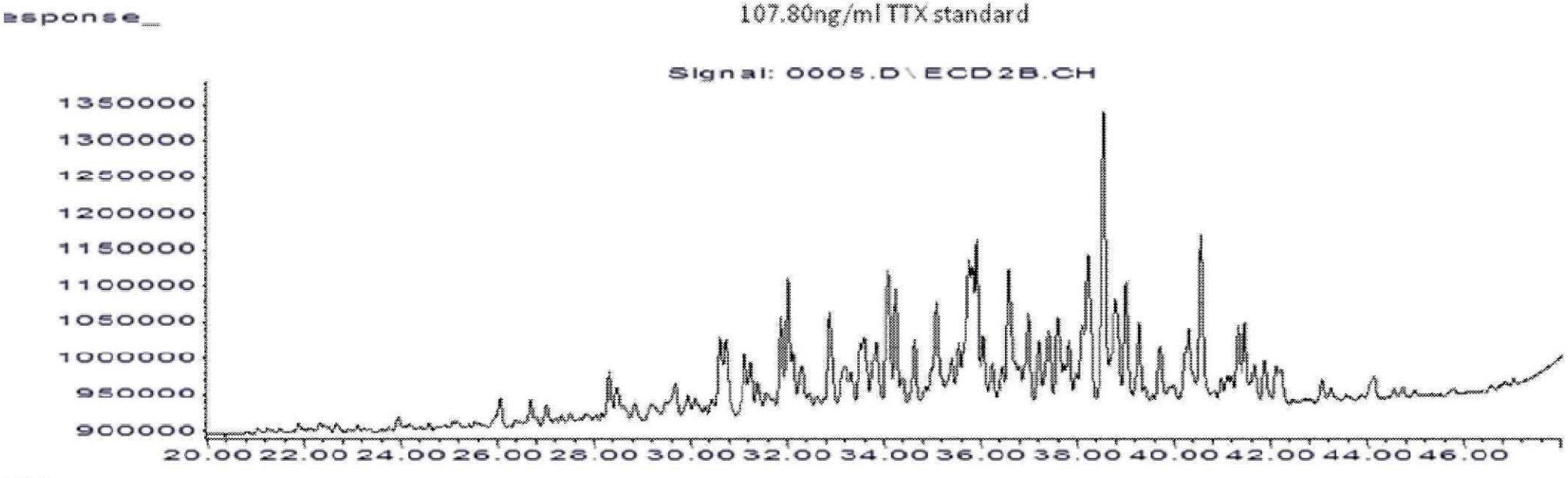
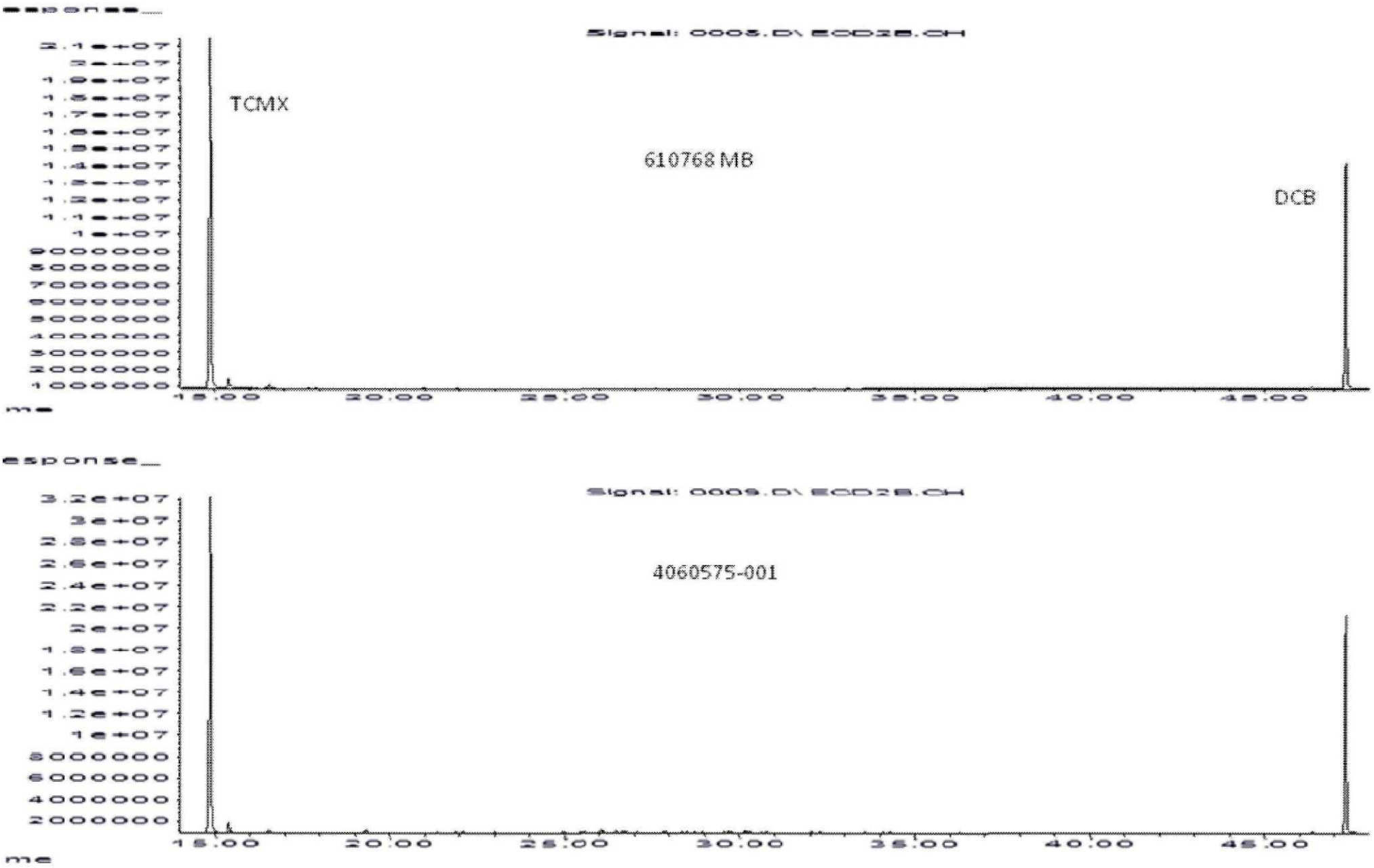


Figure 2 – ECD chromatograms MB and sample



Appendix D

Historical Analytical Data

Appendix D
Historical Analytical Data
Hercules 009 Landfill
Brunswick, GA
EPA ID No. GAD980556906
Antea Group Project No. WBS23413L1

Chemical Name		Benzene	Total Suspended Solids	Toxaphene	Chlorinated Camphenes
MCL:		5.0		3.0	
Report Units:		UG/L	UG/L	UG/L	UG/L
Well ID	**Sampling Date**				
N-5	10/19/1995	220	--	<5.0	--
N-5	5/23/1996	450	--	<53	--
N-5	6/13/1998	300	<10	<5.2	--
N-5	1/8/1999	620	<10	<5.2	--
N-5	9/14/1999	410	11	<10	--
N-5	8/21/2000	330	<10	<5.0	--
N-5	10/23/2001	46	<10	<5.0	--
N-5	11/14/2002	6.6	<1.2	<5.2	--
N-5	7/1/2004	340	--	<3.0	5.4
N-5	9/28/2004	1.4	--	<3.0	1.6
N-5	3/10/2005	0.65	--	<3.0	<3
N-5	3/22/2006	130	--	<3.2	<3.2
N-5	5/2/2007	330	--	<2.9	1.2
N-5	3/19/2008	12.6	--	<2.8	<2.8
N-5	6/25/2009	150	--	<0.46	<0.46
N-5	05/19/2010	279	1.4	<0.49	<0.49
N-5	05/11/2011	340	12	<0.56	<0.56
N-5	05/18/2012	710	<5	<0.48	<0.48
N-6DR	10/17/1995	<1.0	--	<5	--
N-6DR	5/22/1996	--	--	<5.3	--
N-6DR	6/13/1998	--	<10	<5.1	--
N-6DR	1/6/1999	--	<10	<5.2	--
N-6DR	9/21/1999	--	<10	<5	--
N-6DR	8/18/2000	--	<10	<5	--
N-6DR	10/24/2001	--	<10	<5	--
N-6DR	11/13/2002	--	2.1	<5.2	--
N-6DR	6/29/2004	--	--	<3	<15
N-6DR	9/28/2004	--	--	<3	0.75
N-6DR	3/8/2005	--	--	<3	--
N-6DR	3/22/2006	<1.0	--	<2.9	<2.9
N-6DR	5/1/2007	--	--	<2.8	<2.8
N-6DR	3/18/2008	--	--	<2.8	<2.8
N-6DR	6/24/2009	--	--	<0.46	<0.46
N-6DR	05/19/2010	<0.41	3.4	<0.51	<0.51
N-6DR	05/11/2011	<0.25	22	<0.56	<0.56
N-6DR	05/18/2012	<1.0	<5.0	<0.49	<0.49
N-7	10/18/1995	<1.0	--	<5	--

Notes:
MCL - Maximum Contaminant Level (National Primary Drinking Water Standards)
< - Not detected at or above indicated laboratory reporting limit
UG/L - micrograms per liter
-- - No information available

Appendix D
Historical Analytical Data
Hercules 009 Landfill
Brunswick, GA
EPA ID No. GAD980556906
Antea Group Project No. WBS23413L1

Chemical Name		Benzene	Total Suspended Solids	Toxaphene	Chlorinated Camphenes
MCL:		5.0		3.0	
Report Units:		UG/L	UG/L	UG/L	UG/L
Well ID	**Sampling Date**				
N-7	6/3/1996	--	--	<5	--
N-7	6/15/1998	--	<10	<5.1	--
N-7	1/8/1999	--	<10	<5.3	--
N-7	9/21/1999	--	<10	<5	--
N-7	8/21/2000	--	<10	<5	--
N-7	10/23/2001	<1.0	<10	<5	--
N-7	11/14/2002	--	<1.2	<5.2	--
N-7	6/30/2004	--	--	<3	<14
N-7	9/28/2004	--	--	<2	--
N-7	3/10/2005	--	--	<3	<3
N-7	3/23/2006	<1.0	--	<3	<3
N-7	5/2/2007	--	--	<2.8	<2.8
N-7	3/20/2008	--	--	<2.8	<2.8
N-7	6/25/2009	--	--	<0.46	<0.46
N-7	05/19/2010	<0.41	1.8	<0.49	<0.49
N-7	05/11/2011	<0.25	8.0	<0.53	<0.53
N-7	05/18/2012	0.49J	<5.0	<0.48	<0.48
N-10	10/17/1995	<1.0	--	<5	--
N-10	5/22/1996	--	--	<5.4	--
N-10	6/13/1998	--	<10	<5.1	--
N-10	1/6/1999	--	<10	<5.2	--
N-10	9/21/1999	--	<10	<5	--
N-10	8/18/2000	--	<10	<5	--
N-10	10/25/2001	--	<10	<5	--
N-10	11/13/2002	--	1.6	<5.1	--
N-10	6/29/2004	--	--	<3	<15
N-10	9/28/2004	--	--	<2	<2.5
N-10	3/9/2005	--	--	<3	<3
N-10	3/22/2006	<1.0	--	--	<3.1
N-10	5/1/2007	--	--	--	<2.8
N-10	3/18/2008	--	--	<2.8	<2.8
N-10	05/19/2010	<0.41	11.9	<0.50	<0.50
N-10	05/11/2011	<0.25	13	<0.55	<0.55
N-10	05/18/2012	<1.0	<5.0	<0.47	<0.47
N-12	10/31/1995	<1.0	--	<5.4	--
N-12	6/13/1998	--	130	<5.3	--
N-12	1/6/1999	--	69	<5.1	--

Notes:
MCL - Maximum Contaminant Level (National Primary Drinking Water Standards)
< - Not detected at or above indicated laboratory reporting limit
UG/L - micrograms per liter
-- - No information available

Appendix D
Historical Analytical Data
Hercules 009 Landfill
Brunswick, GA
EPA ID No. GAD980556906
Antea Group Project No. WBS23413L1

Chemical Name		Benzene	Total Suspended Solids	Toxaphene	Chlorinated Camphenes
MCL:		5.0		3.0	
Report Units:		UG/L	UG/L	UG/L	UG/L
Well ID	**Sampling Date**				
N-12	9/13/1999	--	<10	<5	--
N-12	8/21/2000	--	<10	<5	--
N-12	10/23/2001	--	<10	<5	--
N-12	10/30/2001	<1.0	--	<5	--
N-12	11/14/2002	--	1.7	<5.1	--
N-12	6/30/2004	--	--	<3	1
N-12	9/28/2004	--	--	<2	--
N-12	3/9/2005	--	--	<3	<3
N-12	3/22/2006	--	--	<3	<3
N-12	3/29/2006	<1.0	--	--	--
N-12	5/2/2007	--	--	<2.8	<2.8
N-12	3/18/2008	--	--	<2.8	<2.8
N-12	6/25/2009	--	--	<0.47	<0.47
N-12	05/19/2010	<0.41	<2.0	<0.49	<0.49
N-12	05/11/2011	0.33J	9.0	<0.54	<0.54
N-12	05/18/2012	0.32J	10	<0.48	<0.48
N-15S	10/18/1995	<1	--	<5	--
N-15S	6/3/1996	--	--	<5	--
N-15S	6/12/1998	--	<10	<5.1	--
N-15S	1/7/1999	--	35	<5.1	--
N-15S	9/14/1999	--	<10	<5	--
N-15S	8/22/2000	--	<10	<5	--
N-15S	3/10/2005	--	--	<3	<3
N-15S	3/23/2006	<1	--	<3.1	<3.1
N-15S	5/3/2007	--	--	<2.8	<2.8
N-15S	3/19/2008	--	--	<2.8	<2.8
N-15S	6/24/2009	--	--	<0.46	<0.46
N-15S	05/19/2010	<0.41	<1.2	<0.49	<0.49
N-15S	05/11/2011	<0.25	46	<0.54	<0.54
N-15S	05/18/2012	<1.0	<5.0	<0.49	<0.49
N-15D	10/18/1995	<1	--	<5	--
N-15D	6/3/1996	--	--	<5	--
N-15D	6/12/1998	--	<10	<5.1	--
N-15D	1/7/1999	--	<10	<5.1	--
N-15D	9/22/1999	--	<10	<5	--
N-15D	8/22/2000	--	<10	<5	--
N-15D	10/25/2001	--	<10	<5	--

Notes:
MCL - Maximum Contaminant Level (National Primary Drinking Water Standards)
< - Not detected at or above indicated laboratory reporting limit
UG/L - micrograms per liter
-- - No information available

Appendix D
Historical Analytical Data
Hercules 009 Landfill
Brunswick, GA
EPA ID No. GAD980556906
Antea Group Project No. WBS23413L1

Chemical Name		Benzene	Total Suspended Solids	Toxaphene	Chlorinated Camphenes
MCL:		5.0		3.0	
Report Units:		UG/L	UG/L	UG/L	UG/L
Well ID	**Sampling Date**				
N-15D	11/14/2002	--	6.2	<5.2	<14
N-15D	7/1/2004	--	--	<3	<2.5
N-15D	9/29/2004	--	--	<3	--
N-15D	3/10/2005	--	--	<3	<3
N-15D	3/23/2006	<1	--	<3.1	<3.1
N-15D	5/3/2007	--	--	<2.8	<2.8
N-15D	3/19/2008	--	--	<2.8	<2.8
N-15D	6/24/2009	--	--	<0.46	<0.46
N-15D	05/19/2010	<0.41	3.1	<0.53	<0.53
N-15D	5/11/2011	<0.25	16	<0.58	<0.58
N-15D	5/18/2012	<1.0	<5.0	<0.46	<0.46

Notes:
MCL - Maximum Contaminant Level (National Primary Drinking Water Standards)
< - Not detected at or above indicated laboratory reporting limit
UG/L - micrograms per liter
-- - No information available